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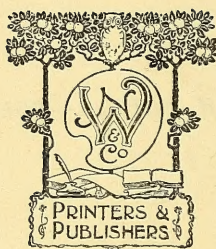
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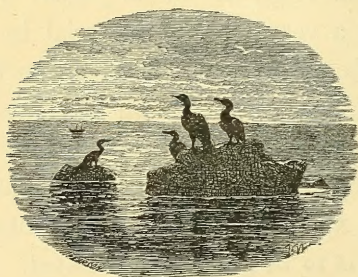
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P R E F A C E.

THE present volume of 'THE ZOOLOGIST' forms the sixty-sixth since its foundation in 1843. This denotes a remarkable longevity, and its pages still exhibit no sign of senility; much healthy competition has taken place during these long years—journals on similar lines have appeared and disappeared, but for sixty-six years 'THE ZOOLOGIST' has never failed in the regularity of its monthly publication. By the death of John William Douglas in 1905 the last of the contributors to its first volume passed away, but in the long series of volumes scarcely the name of an English zoologist is missing among its contributors. Unfortunately no obituary notice has appeared of very many who have written in its pages; were it otherwise, we should possess a very valuable material in the biographical roll-call of British naturalists. This melancholy information is frequently unknown to the Editor till long after the event, and he would earnestly ask the contributors to apprise him of such occurrences and to supply, if possible, the necessary facts. It affords material of considerable literary value, and on many grounds is to be greatly desiderated.

The most cursory perusal of these, or any of these, sixty-six volumes gives no uncertain indication of the prevalent studies of British naturalists. Ornithology undoubtedly holds the first place, and the love of birds is only equalled by that of insects, though the former naturally is, and always will be, the prominent feature of 'THE ZOOLOGIST,' entomology having so

many of its own special publications. Mammals and Fishes in the order named come next in popularity; after these Reptiles and Crustacea; the other Orders are treated in a more sporadic manner. If this is the evidence of 'THE ZOOLOGIST' to the present date we may well speculate on the conclusions that may be drawn when another sixty-six volumes are completed. The trend in zoological study over a given period is an important factor in the estimation of biological speculation, and the breath of philosophical theories as regards animal life during different generations or individual life epochs. We must often considerably value a theory or conclusion by the personal equation, by the knowledge and personal and mental attitude of its promoter, as well as by the zoological standpoint of his day. 'THE ZOOLOGIST' reflects the latter over a considerable number of years.



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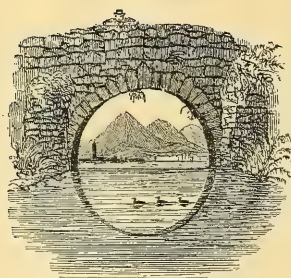
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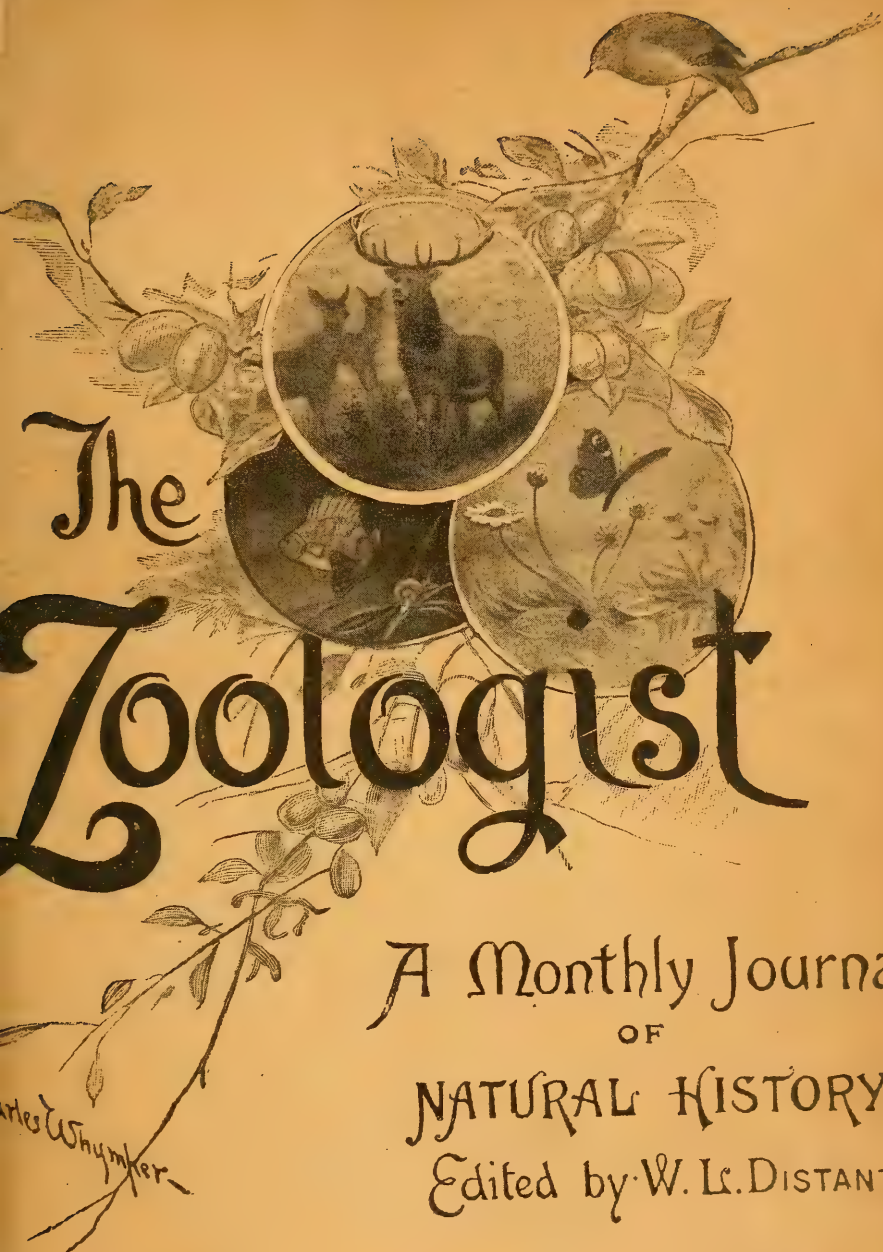
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A

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THE ZOOLOGIST

No. 799.—January, 1908.

THE MARTEN IN ENGLAND AND WALES.

BY H. E. FORREST.

IN 'The Zoologist,' 1891-3, Mr. J. E. Harting gave a detailed account of the Pine Marten (*Mustela martes*) and its distribution throughout Great Britain and Ireland.

The object of the present paper is to supplement the above, and to bring it up to date as regards England and Wales. To avoid repetition, the records in Mr. Harting's papers are merely indicated below by the letter H, followed by the year of occurrence. Their inclusion renders this paper more complete, without materially increasing its length.

The Marten still lingers in the Lake District and in the north-west of Wales. It has therefore seemed most convenient to deal first with those districts, taking next the counties adjoining, and finally the isolated occurrences in the eastern and southern counties of England.

Anglesey.—Not recorded.

Carnarvon & Merioneth.—Still found in the wilder parts of these counties, though in reduced and rapidly diminishing numbers. The late Mr. E. O. Partridge, of Farchynys, Dolgelley, records sixteen killed in that district in 1893. Stuffed specimens are to be seen in many houses and hotels in these counties.

Cardiganshire.—No record except an example reported to me
Zool. 4th ser. vol. XII, January, 1908.

by Mr. W. Yelland, who saw it at Hafod, near Devil's Bridge, about 1878.

Radnorshire.—The late Mr. J. W. Lloyd had a specimen killed at Stanage about 1840, and records one obtained at Harpton Court about 1862. Another taken about the same date is preserved at Clyro Court, whilst Mr. O. R. Owen reports two killed near Rhayader in the late nineties. Mr. J. W. Vaughan states that in the winter of 1906–7 several Hares were found dead by a shepherd near Erwood. In each case the animal had been killed by a bite just over the heart; this is said to be the way a Marten always kills its prey. There is other evidence that the Marten still exists in Radnorshire and in the neighbouring county of Brecon.

Brecon.—H. Several between 1857 and 1886. In the last-mentioned year Mr. E. Cambridge Phillips records one seen near Brecon. Several observers report the Marten as still existing in the county, though in very small numbers.

Pembroke.—No certain record.

Carmarthen.—H. About 1868. Mr. W. M. Congreve informs me that Jeffreys, of Carmarthen, had two to preserve, shot by Mr. Thompson, of Glyn Abbey, Kidwelly, about 1880.

Glamorgan.—H. 1849. Mr. T. W. Proger remembers a pair being trapped at Courtyralla, near Cardiff, in 1872. The female is now in the local museum. Sir John Llewelyn informs me that he had one brought to him for preservation at least thirty-five years ago; it was obtained near Swansea.

Monmouth.—Mr. T. W. Proger reports two or three trapped in the neighbourhood of Pontypool about 1866. H.: one at Grosmont, 1873.

Herefordshire.—H. Three about 1860; others 1861, 1866, 1873, 1878, 1884. Mr. J. B. Pilley informs me that two were obtained at Haywood and Wellington (both places within a few miles of Hereford city) in the eighties.

Gloucestershire.—H. Formerly; 1881.

Worcestershire.—Hastings described it as rare in 1834, and as formerly inhabiting Malvern Chase.

Warwickshire.—Not recorded.

Staffordshire.—Recorded by Garner as taken near Cheadle, and at Needwood; no dates are given, but must have been prior

to 1844. Mr. J. R. B. Masefield writes that one was obtained on the Staffordshire side of Dovedale many years ago. From independent sources the Rev. F. C. R. Jourdain gathers that the date was about 1835.

Derbyshire.—Mr. Jourdain also informs me that a Marten was exhibited in a cage in the market-place, Manchester, about 1830, that was said to have been taken in the High Peak.

Cheshire.—Byerley records two obtained in Wirral in the forties. Mr. R. Newstead mentions one killed at Sandbach in 1876, and a male, now in the Chester Museum, killed at Eaton (the Duke of Westminster's seat), July 8th, 1891.

Denbigh & Flint.—A few days after the Eaton example was obtained another was killed at Hope, whilst in April, 1892, another was taken at Connah's Quay. The Marten still lingers precariously in the far west of Denbighshire, and possibly in Glyn Ceiriog (*cf.* Forrest, 'Fauna of North Wales,' p. 31).

Montgomery.—None recorded for many years till about 1865, when one was killed at Maesmawr, near Welshpool. Another, in the collection of the late Mr. G. Dumville Lees, was obtained at Abermule in November, 1895, and reported by Mr. Lees at the time in the 'Field.'

Shropshire.—Eyton wrote of the Marten as getting scarce in the thirties, but I know of six or seven examples obtained in the Ludlow district during the forties. One was obtained in Stokes Wood, Craven Arms, in 1862. No others till 1907, when two were taken, both females; the first near Chirbury about April 20th, the second at Millichope a fortnight later. This last has been presented by Capt. Beckwith to the Shrewsbury Museum.

Lancashire.—H. Still found in Furness district, 1877. In 'The Zoologist,' 1896, p. 376, Mr. J. R. Denwood records one at Coniston in June, 1896. In 'The Zoologist,' 1904, p. 455, is a record of an old female obtained in the same district, May 13th, 1902.

Yorkshire.—H. 1854, 1877, 1880, 1881, 1884. Mr. H. B. Booth tells me that a Marten was obtained at Buckden, on the north-west border of the county, about 1880; whilst Mr. T. H. Nelson recorded in 'The Zoologist,' 1900, p. 517, an old male taken at Swainby, in Cleveland, Feb. 9th, 1900. Messrs. Clarke and Roebuck, in their 'Fauna,' record Martens near Whitby in

the sixties, and in 1877; Barnsley, 1878; near Ripon; and above Masham in 1870.

Durham.—H. 1835, 1849, 186-, 1882. Mr. T. H. Nelson informs me that one was killed in Weardale about 1880. Sir Alfred Pease heard of one being taken near Bishop Auckland about 1896.

Westmorland.—H. 1877. One recorded above Elterwater, Sept. 10th, 1896, by Mr. J. R. Denwood (Zool. 1896, p. 376).

Cumberland.—H. Still plentiful, 1877. Obtained 1886, 1887, 1892. The late Rev. H. A. Macpherson, in his 'Fauna of Lakeland,' gives a very full account of the Marten in the Lake District, with many interesting details regarding its habits and the local methods of hunting and trapping the "Sweet Mart." The animal still lingers in the Lake Country, though, unless steps be taken to preserve it, it will soon be exterminated.

Northumberland.—H. 1871, and two in May, 1883.

Lincolnshire.—H. 1843, 1854, 1858, 1866, 1871, 1879, 1882. In 'The Zoologist,' 1893, p. 354, one is recorded near Sleaford about 1889.

Leicester.—H. Two or three many years ago. Mr. F. T. Mott informs me that a Marten was killed at Bradgate about 1868; then none reported till December, 1903, when Mr. H. S. Davenport saw one in Tugby Wood. He recorded it at the time in the 'Field.'

Notts.—Mr. J. Whitaker thinks that the Marten must have formerly been found in Sherwood Forest. A specimen in Mr. Becker's collection was killed at Winkburn in 1850, while two captured on the Worksop Manor estate in 1872 are mentioned in the 'Victoria History.' A Marten taken in a cellar at Nottingham in 1901 was doubtless an escape.

Norfolk.—H. 1843, 1864, 1878.

Suffolk.—H. Three in 1811; male shot and another seen, 1889 (Zool. 1892, p. 134).

Cambridge.—H. 1844.

Northants.—H. 1840.

Bedfordshire.—H. Prior to 1859. Mr. J. Steele Elliott has notes of several in the forties, and evidence that the animal was not uncommon early in the nineteenth century.

Oxfordshire.—H. One or two many years ago.

Bucks.—H. Formerly existed.

Berks.—H. One; no date.

Herts.—H. 1872.

Essex.—H. 1845, 1853.

Kent.—H. About 1830.

Surrey.—H. 1834, 1847; one seen by Mr. G. E. Lodge near Dorking, May 12th, 1879.

Sussex.—H. Three about 1841; 1866.

Hants.—H. About 1845, 185—.

Wilts.—H. Seventeenth century.

Dorset.—H. 1851.

Devon.—H. 1871; nearly extinct, 1877.

Cornwall.—H. 1843, 1878.

DIGEST.

From the above records several interesting conclusions may be drawn:—

1. The Marten became rare throughout the midland and south-eastern counties during the first half of the nineteenth century.

2. In most of these counties it became extinct before 1860, but since that date there have been isolated occurrences in Herts, Surrey, and Sussex.

3. In the group of eastern counties—Lincoln, Norfolk, and Suffolk—it survived into the eighties, whilst there have been recent occurrences in Leicestershire.

4. In Devon and Cornwall it lingered into the seventies.

5. At the present time there are but two tribes of Martens remaining in England and Wales, their respective headquarters being the Lake District and the west of North and Central Wales.

6. From time to time Martens still occur in the counties contiguous to these two districts.

7. Recent records are most numerous in the counties nearest to these districts. (Lincolnshire is an exception.)

8. In Wales the Marten has occurred in all the twelve counties except Anglesey and Pembroke, but appears never to have been common in the southernmost counties.

ROVING DISPOSITION OF THE MARTEN.

Leaving out of the calculation those counties where the Marten is believed still to exist, it will be observed that isolated examples have occurred within the last thirty years in the counties of Cheshire, Hereford, Montgomery, Flint, Shropshire, Lancashire, and Yorkshire; as well as further off in the eastern counties of Lincoln, Leicester, Norfolk, Suffolk, and Surrey.

In nearly every county mentioned the Marten had been regarded as long extinct. In some instances intervals of twenty, thirty, and even forty years had elapsed since the last previous record; when without the slightest indication of the animal's existence in the neighbourhood a Marten has been seen, trapped, or shot.

Take Shropshire, for example. The last prior record was in 1862. During the ensuing forty-five years there was not even a rumour of the existence of the Marten within the limits of the county, and the species was regarded as locally extinct. Yet in the spring of 1907 two Martens—both females—were taken within a fortnight at places only a few miles apart, and in the same part of the county as the 1862 example.

Somewhat similar are the records for the counties to the north—Montgomery, Flint, and Cheshire. In the first of these a period of thirty years elapsed between the two examples being obtained. But in the other cases the events are rendered still more remarkable by the nature of the localities. Two Martens were obtained in 1891, within a few days of one another, at Hope (Flintshire) and Eaton (Cheshire), whilst in 1892 another was taken at Connah's Quay (Flintshire). All these three places are within ten miles of one another, but they are of a character quite unsuited to such an animal as the Marten. Eaton Park is the seat of the Duke of Westminster; it is flat country, laid out artificially in plantations and ornamental grounds. Connah's Quay is a dreary flat alongside of the Dee estuary, chiefly used as a place for shipping slates. Hope is not quite so unsuitable, but lies low in a fairly populous and cultivated district.

I cannot believe that any of these five Martens, nor the two recent Shropshire examples, belonged to the districts where they were taken; neither do I believe they had been there any length of time. How, then, can their presence be accounted

for? In my opinion the answer to this question is to be found in the Marten's innate love of roving. This trait would not be noticeable as long as the animal was common, because any examples met with would be regarded as denizens of the districts where they occurred. It would only become obvious when a Marten turned up in a district where it had been long regarded as extinct.

Independently of such incidents, however, several writers have noted the Marten's propensity for roaming. Thus Mr. George Bolam, of Berwick-on-Tweed, writes (*Zool.* 1893, p. 132) : "The travelling capabilities of the Marten are too well known to require further comment." Again, Mr. Dumville Lees, reporting the Abermule specimen in the '*Field*,' Nov. 23rd, 1895, remarks:—"I know that Martens travel long distances at all times, but particularly in the early spring." (Parenthetically, I may state that the isolated occurrences of the Marten recorded above were mostly in the early part of May.) In a later issue Mr. E. O. Partridge, of Farchynys, near Dolgelley (who had a more intimate acquaintance with the Welsh Marten than anyone else in recent times), adds:—"I quite endorse the opinion of Mr. Lees that Martens travel long distances, but I think that, as a rule, after their night's ramble, they return and remain pretty much in any favourite locality where they have taken up their quarters. It has more than once happened to us, when the snow has been lying deep on the Grouse-moor, to hit on the track of a Marten, and, after following it for miles, to find, just as evening was coming on, that the ring of many miles had brought us round pretty nearly to the point of starting." It has been found, by tracking in the snow, that frequently the Marten will cover a circuit of fifteen miles in a day, and that not when it was flying from pursuit but merely seeking food.

To an animal that will travel such distances of its own accord the journey from (say) Dolgelley to Abermule would be a trifle, so it is conceivable that, if the quest for food had brought a Marten over the intervening high land, it might take up its quarters in this new district.

It is to such circumstances as these, I believe, that the recent occurrences in Shropshire, and those recorded at Eaton, Hope, and Connah's Quay are due.

Similarly, the examples met with during recent years in Yorkshire and other northern counties were probably wanderers from the Lake District. Possibly, also, those recorded in North Lincolnshire.

Without wishing to dogmatize, I would further suggest that, if a Marten had wandered very far from its native haunts, it would perhaps be less inclined to settle down ; it would go on wandering until it at length met its fate in some country too civilized for this beautiful creature of the wilds.

Of our native mammals, none excel the Marten in grace of movement and beauty of form. Can nothing be done to prevent its extermination ? If any action be taken, it should be speedily. To preserve it throughout the country would be impracticable, but I suggest that some large landowner in Wales or the Lake District should make his estate a sanctuary for the animal, and let his keepers strictly preserve it. This plan was adopted in Scotland for the Golden Eagle, and with entire success. There would be no risk of undue multiplication of the species, as the Marten is so easily trapped that, if eventually the numbers on the estate became too great, the owner could give orders to reduce them. In such cases individual control is far more effective than legislation.

SWARMS OF INSECTS, &c., IN THE CRIMEA.

BY LIONEL E. ADAMS, B.A.

On three separate occasions when I have visited the Crimea I have encountered one or more instances of various insect forms swarming in enormous quantities and being dispersed to considerable distances, and it has occurred to me that a brief account of these may be of interest to students of the ways and means of the distribution of various species across the sea.

*Moths.**—On August 27th, 1901, we left the Bosphorus at sunset for Eupatoria, a distance of roughly three hundred and seventy English land miles. On coming on deck the next morning at eight o'clock I found the whole ship covered with a small moth, which also filled the air like flakes in a snow-storm. All day long we had a pair of Warblers on board, which had apparently been blown off the land with the moths or had followed them of their own accord. I caught one in my hand and released it unharmed. They were very tame, picking up the moths greedily from the deck close to my feet.

We experienced a strong head wind all the way across to Eupatoria, and the flight of moths met us all the way across the swarm being plentiful there on our arrival. Four days later we anchored in Karkinit Bay in the Gulf of Perikop. I quote from my field note-book :—"Sept. 6th, 1901. I found the shore at Bakal lined twenty to fifty yards in width with small bushes and brambles. These were thickly crowded with the same small moth that we have had in crowds all across the Black Sea. At every step among the bushes a swarm of disturbed moths would fly up."

The next year I was in the Black Sea rather later when the annual (?) swarm of this small moth was presumably almost over, for I find the following entry in my field note-book :—"Aug. 21st, 1902. The same species of Warbler that came on board last voyage came on board at Kavak, and accompanied us to Theodosia. It was after the same species of moth as before."

* I much regret that the specimens brought back for identification have always miscarried.

Again, quoting from my field note-book :—"July 26th, 1907. All across the Black Sea from the Crimea to the Bosphorus we were accompanied by a mighty swarm of moths—the same, I think, that I noticed in 1901. A vast swarm of beetles and butterflies (Painted Ladies) accompanied them, and also a few other moths. A strong and continuous north wind brought them."

Dragonflies.—In August, 1902, we were lying off Ghenitshesk in the Azov, and were troubled with flies and gnats &c. that were blown out to us from the shore; they came in great quantities quite suddenly with a change of wind. My note-book records our deliverance from the plague thus :—"August 26th, 1902. A swarm of small dragonflies (blue, red, and yellow) invaded the ship and fed on the gnats &c." Our authority, Mr. W. J. Lucas, identified them as *Sympetrum fons-colombii*, which he informed me were migrating at this time. Most of them departed in a day or so, though occasional stow-aways emerged from odd corners during the rest of the voyage.

Beetles.*—Lying off the southern end of the Tonka of Arabat in the Azov we experienced a plague of beetles, which I recorded as follows :—"July 10th, 1907. To-day there was an epidemic of black beetles about an inch long, which flew on board in crowds, and were swept up in heaps dead—some killed by paraffin, and some roasted to death on the hot steam pipes &c. The swarm has evidently been immense, as it lasted for three or four hours, and came with the north wind which must have blown the beetles from the north coast some fifty miles away, and therefore quantities must have been drowned on the way. When I went ashore at four p.m. (a distance of two miles) drowned beetles were to be seen in thousands all the way to the shore." This species came again in batches every two or three days and, as previously mentioned, accompanied us across the Black Sea. I have the following note written when the Bosphorus was again reached :—"Black Sea July 24th, 1907. At Kertch (July 22nd) I saw hundreds of the same beetles in the sea, and all across the Black Sea we had another plague of them, especially on July 24th. There was a north-west wind all the time, which brought them from the Crimea."

* I am indebted to Mr. W. F. Kirby for identifying these as *Harpalus calceatus*, Duftschm.

Butterflies (Pyrameis cardui).—Perhaps the most remarkable swarm was that of Painted Ladies. I quote from an entry in my field note-book, written just before leaving Arabat Bay for Kertch on July 20th:—"Ever since July 10th Painted Ladies have been very numerous, but on the 15th and 16th the ship was swarming with them, and as far as the glass could reach the air was full of them, all coming down with a north wind. Only comparatively few stopped on board the ship. The swarm continued for two days. On the third day when I was ashore, as I walked along the Tonka among the low scrub, hundreds rose as I disturbed the bushes. Swallows and Hoopoes were about hawking for insects, but I did not see them go for the Painted Ladies. At night at the merchant's house* they roosted in thousands among the small trees and the creeper covering the verandah and were easily picked off asleep. On one occasion when we were dining under the creeper by candle-light someone gave the creeper a smart jerk above our heads, whereupon a cloud of the sleepy creatures fluttered down, and we counted over a hundred on the cloth. With this swarm there were a few other species, among which the most prominent were the Gold-tail (*Porthesia auriflua*) and the Spurge-hawk (*Deilephila euphorbiæ*)."

"July 26th, 1907. We left Kertch July 22nd, and were followed almost to the Bosphorus by a north-west wind. On the 24th we came into a swarm of *P. cardui*, which had evidently been blown from the Crimea. Ever since the first swarm at Arabat I have noticed these butterflies in vast numbers wherever I have been ashore (*i. e.* at Akmanai, Theodosia, and Kertch). A very noteworthy characteristic and one that I have not observed before in any butterfly is the habit of soaring through the air like a bird without flapping the wings. It was a curious and beautiful sight."

Toads (Bufo viridis).—"July 13th, 1907. Leaving Theodosia by train for Akmanai (a distance of thirty miles) we passed over flat arable land which had been deluged with rain during the previous night. During the whole of the journey the railway

* A small farm used by our charterer temporarily while we were loading, and where I often spent the night instead of returning on board after a ramble ashore.

track was literally black with small Toads which tried to hop away at our approach. The fields and ditches by the line were also swarming with Toads as far as could be seen."

Unless one has witnessed a flight of Locusts, or the immense shoals of migrating fish, it is difficult to imagine the magnitude of these swarms. It might help one to realize the conditions of such invasions if a swarm on a like scale were to invade the British Isles, the length and breadth of which roughly correspond with the area which my observations show to have been actually covered by some of the swarms in the Black Sea and Azov—though how much further they travelled south, or from how much further north they came, or how wide a space the flights covered, I cannot say. My impression is that most of these particular flights would be checked by the hills on the south of the Black Sea where the wind dies down, for as soon as this happens insects, especially beetles, have a tendency to drop and settle—a fatal proceeding if they happen to be over the sea at the time. At any rate the north-west wind which carried the Painted Ladies and the beetles died down as we reached the Bosphorus, and I only noticed a few of the former at Constantinople, and none after that except one or two on board the ship that had most likely been passengers from the Black Sea.

Suppose, then, such a flight of butterflies or beetles covering the whole of our islands for the best part of a week—or suppose that after a thunder-shower the whole of Middlesex were to become black with hopping Toads—I think the papers would universally chronicle such events; whereas only a few ocean-going tramps pass through these Russian swarms, and the only notice taken is evinced by a little extra "language" when the beetles or what not mingle with the "Harriet Lane" or "White-chapel Mysteries" in the mess-kids. Of course the moujiks ashore never seem to notice anything.

As I have watched these myriads of wind-borne creatures lightly hurrying past for days together the thought often occurred to me that, given a continuance of favourable winds, a tremendous distance might be traversed before the crowd would become too thin to make sure of some settling on ocean islands, however small and scattered.

AN ANNOTATED LIST OF CORNISH FISHES.

BY JAMES CLARK, M.A., D.Sc., A.R.C.S.

(Concluded from vol. xi. p. 459.)

THE Thick-lipped Grey Mullet (*Mugil chelo*, Cuv.) occurs commonly all the year round along the south coast in small shoals or schools, and is of frequent occurrence at St. Ives. During the summer months it is plentiful in harbours and estuaries, and has been reported in the Fowey some distance beyond the reach of tidal water. In July, 1904, several were taken one afternoon with an artificial fly at Truro Quay; and Cunningham mentions that it is common in Swanpool, near Falmouth, an almost freshwater ley, into which the Mullet can only enter through a narrow grating when they are young and quite small. By far the most important catches in the county are made at Sennen, near Land's End, where there is a regular Grey Mullet fishery throughout the winter. Enormous schools congregate there almost every year, and by means of a special draw-seine, the ownership of which is divided into ninety-five shares, as many as ten to twelve thousand have been captured at a time. The first school is expected about the middle of November, and in some seasons the fish are taken all through the winter, especially on moonlight nights. They are often seen lying for days in an awkward place under the cliffs or on a rocky ground, and are carefully watched till the school moves into shallower water on a sandy bottom, where the seine can be shot. They also appear frequently in various coves between Whitsand Bay and St. Ives, and are common in Lelant estuary during summer and autumn (Vallentin). They have been taken at Newquay, and at least once, about seven years ago, at Port Isaac. When a seine is shot the fish, as a rule, become very lively and excitable, and at times a large number may spring high out of the water over the edge of the net. A little straw on the surface of the water, however, will prevent their jumping. The Sennen

fishermen often go into the water up to their waists and hold the edge of the net overhead to hinder their escape. Elsewhere along the south and about St. Ives the schools are relatively small. The largest specimen handled by the writer weighed twelve pounds fourteen ounces, and was taken at Coverack. Great schools of young Grey Mullet an inch or less in length are occasionally seen in Falmouth Harbour from the middle of July to the middle of August. On the 14th of July, 1906, there was a great swarm on Gyllyngvase beach, where the long stretch of sand abuts against the low weed-covered rocky ground opposite Swanpool. Last year (1907) they were plentiful in Fowey Harbour during the third week in August, and at Mevagissey a few days later. The Thin-lipped Grey Mullet (*Mugil capito*, Cuv.) is not distinguished by the fishermen from the preceding species, but Day implies it was common along the south. In December, 1906, two were sent in from Sennen, and in February of the present year (1907) a school appeared in Falmouth Bay and Harbour, but these seem to be the only recent records. The Sand Smelt or Atherine (*Atherina presbyter*, Jenyns) is a common visitor in large shoals in autumn, and colonies remain here and there in shallow water along the south coast, as at Mevagissey, St. Mawes, Coverack and Porthleven, throughout the winter. In January, 1907, several were picked up dead on the sand at the Bothwick Rocks, Newquay. The Larger Launce (*Ammodytes lanceolatus*, Lesauvage) is locally common on sandy bottoms in shallow water along the south coast, and on the north especially at St. Ives, where this and the next species are often taken in large numbers in a drag-seine shot with that intention. Vallentin has seen the Gannets there so gorged with this fish as to be unable to fly. In other localities it is generally dragged out of the sand by sickle-shaped hooks specially made for the purpose. The Lesser Launce (*Ammodytes tobianus*, L.) is very common on sandy shores all round the coast. The Pike (*Esox lucius*, L.) was introduced by the Rev. John Daubuz into one of his ponds at Killiow, near Truro, but it died out or was exterminated many years ago (J. D. Enys). The Garfish or Gerriek (*Belone vulgaris*, Flem.) occasionally appears in shoals in March, as off the Wolf Rock in 1900, and about seventy miles N.N.W. of the Longships in 1907; and sometimes in autumn, as, for example, eight miles

south of the Lizard in September, 1902; but it is usually found accompanying Mackerel, and, indeed, a few are taken with almost every catch of that fish. In July, 1907, an adult specimen was captured with a baited hand-line off Newquay. When so taken it displays remarkable activity, and sometimes tangles the line in a very singular fashion. In spite of its bright green bones and unpleasant odour this fish is much in demand at Newlyn for the London market. Elsewhere it is greatly appreciated as bait, and when cut into strips or "snaids" is more effective than Mackerel. On Oct. 8th, 1907, a large shoal of young Garfish from three and a half to four inches long was noticed in Falmouth Harbour. Three days later they had all disappeared. The Saury Pike or Skipper (*Scombresox saurus*, Bl. Schn.) is evidently a regular visitor—often in large shoals—off the south and west of the county, and at least occasionally in the Bristol Channel. Large quantities are frequently taken a mile or two off land in summer and autumn in drift-nets and in Pilchard-seines, and it has been obtained in the Fowey almost at the limit of tidal influence. In September, 1903, it was remarkably abundant several miles south-west of Newlyn, and in November, 1901, a drift-boat brought in a number at Newquay. The Greater Flying-fish (*Exocetus volitans*, L.) was reported by R. Q. Couch as having been seen by him in Mount's Bay, but the only authentic specimen recorded from the county was obtained by I. Couch from the Helford River. The Three-spined Stickleback (*Gasterosteus aculeatus*, L.) is somewhat locally distributed round the county, but abounds in many of the streams. At times in the late spring the variety *trachurus* is plentiful in Fowey Harbour, about Falmouth and Helford, and in 1902 was common at the Fistral Beach, Newquay. The variety *spinulosus* is common in the streams of the middle and west, but apparently scarce in the east, and the variety *gymnurus* occurs somewhat sparingly in the streams about Truro. The Fifteen-spined Stickleback or Sea-adder (*G. spinachia*, L.) is common along the south coast and local on the north. Its nests are occasionally found among the low weed-covered rocks between tide-marks at the westerly end of Fistral Bay, Newquay.

The Broad-nosed Pipe-fish (*Siphonostoma typhle*, L.) is fairly common locally among *Zostera* along the south, and particularly

in Falmouth Harbour and the mouth of Helford River. It has also been taken at St. Ives, at Padstow, and near Bude. The Greater Pipe-fish (*Syngnathus acus*, L.) is occasionally taken at Gyllyngvase Beach among the seaweed at low spring-tide, is moderately common on weed-covered bottoms and on low rocks from shallow water downwards along the south and west, and may occasionally be seen slashing along the surface of the water as much as three or four miles from land. On the north coast it has been taken at St. Ives and at Padstow. *Syngnathus rostellatus*, Nilsson, has till lately been confused with *S. acus*. It has been obtained at Cawsand Bay (M. B. A.), at Mevagissey, and near Coverack, and may be common. The Snake Pipe-fish (*Nerophis æquoreus*, L.) is common, at least locally, all round the coast from shallow water downwards. It is often found attached to Crab- and Lobster-pots, and in August, 1907, several pieces of netting submerged in Falmouth Docks for six weeks by the writer in connection with some County Council net-tanning experiments were taken possession of by hundreds of this fish. They were all immature, the largest being nine inches in length, and clung tightly to the thread of the net by means of their tails. One piece of the netting, about three yards square, slimy with green seaweed, carried no fewer than a hundred and twenty-two specimens when it was pulled on board, and another piece, six feet by two, had forty-seven! The Straight-nosed Pipe-fish (*Nerophis ophidion*, L.) is evidently variable in number, but in some years, notably 1904, was locally the most plentiful of all the Pipe-fishes in the county, and on certain days during the summer literally swarmed under stones and tufts of seaweed from half-way between tide-marks downwards about Mevagissey, Gorran, and the mouth of Helford River. It is at times common in shallow water, and has been dredged in quantity down to thirty and thirty-five fathoms in Falmouth Bay. For the last two years (1906 and 1907) it has been very scarce as a littoral species at Gyllyngvase and Helford, and apparently, indeed, all along the south coast except at St. Michael's Mount. Specimens are occasionally taken along the north coast as far as Bude, where, in July and August, 1905, it was fairly plentiful. The Worm Pipe-fish (*Nerophis lumbriciformis*, Yarr.) is not uncommon in weed-covered rock-pools, and is occasionally plentiful under stones at

low spring-tide along the south and west. On the north coast it has been found at St. Ives, and in August, 1905, a single specimen was obtained under a stone at the Black Rock, Widemouth Bay, Bude. The Hippocampus or Sea-horse (*Hippocampus antiquorum*, Leach) was taken some years ago in a ground-seine at St. Mawes (Rice). On Sept. 14th, 1899, one was captured at Porthleven, on Mount's Bay. An attempt was made to bring it alive in a pickle-bottle to the Technical Schools, Truro, but it died on the way.

The Carp (*Cyprinus carpio*, L.) is common in ponds throughout the county, and the Golden Carp or Gold-fish (*C. carassius*, L., var. *auratus*, Bl.) thrives in ornamental ponds and fountain-basins. Both are, of course, introductions. The Gudgeon (*Gobio fluviatilis*, Flem.) is mentioned by Couch as having been introduced into some ponds near Penzance, but Cornish knew nothing of it, and there is no subsequent record; so that it has probably died out. Dace (*Leuciscus dobula*, L.) was recorded by Couch as confined to the Tamar and its tributaries, and Miss F. E. Tripp describes one that was caught in the Linney. In spite of assertions to the contrary, it does not appear to have been taken either in the Camel or the Fowey. The Minnow (*Leuciscus phoxinus*, L.) has not been seen by the writer west of Truro, though it occurs locally in that neighbourhood, and is probably plentiful in the streams of the east, as Couch, who knew the latter well, says it is common in many of the rivers, but not in all. It is certainly abundant at Trebartha, and in most of the tributaries of the Lynher. It also occurs in Dosemary Pool (J. D. Enys), and in the stream at Harlyn, near Padstow. The Tench (*Tinca vulgaris*, Cuv.), first introduced by Sir Rose Price, Bart., into the ponds at Trengwainton, Penzance (R. Q. Couch), is now a common pond-fish throughout the county. The Loach (*Nemachilus barbatulus*, L.) is evidently scarce in the middle and west, but is reported as plentiful in the east. Miss F. E. Tripp, in some MS. Notes on the Natural History of the Altarnum district, speaks of it as a familiar object in the Linney, and it is found in some of the tributaries of the Fowey. It has been reported from one of the Looe streams, and from the Perranar-worthal stream at Ponjeravah, near Constantine. The Salmon (*Salmo salar*, L.) is chiefly confined to the Tamar, the Fowey,

and the Camel, though during the last few years mine-pollution has almost destroyed both Salmon- and Peal-fishing in the Fowey. Salmon will at times linger for weeks at its mouth without attempting to enter the river till a heavy flood has purified its waters (H. J. Rowse), and in many cases, according to the local fishermen, will pass out to sea again without entering at all. The Camel and the Fowey are among the latest Salmon rivers in England, the bulk of the fish appearing in November and December. Rod-fishing is allowed up to Nov. 30th. Peal (*Salmo trutta*, L., var. *cambrensis*, Donovan.) naturally frequents the same rivers as the Salmon. It begins to run up the Fowey in May and the Camel in June (H. J. Rowse). These early fish are large but few in number. The smaller fish—the school Peal—appear from July or August onwards. The spring Mackerel boats often encounter shoals of Peal in the mouth of the Bristol Channel, most frequently about ninety miles N.N.W. of the Longships. The Trout (*Salmo fario*, L.) is plentiful in almost every non-polluted stream in the county. The indigenous variety—at least in the small streams—is *cornubiensis*, Walb., in which the parr finger-marks persist through life, and the length rarely exceeds eight inches. Several varieties and species have been introduced from time to time into ponds throughout the county.

The Anchovy (*Engraulis encrasicolus*, L.) is probably much more plentiful out at sea round the Cornish coast in autumn and winter than the records would indicate, as the size of mesh in the nets of the drift fishermen is much too large to capture it. In November, 1871, Matthias Dunn took one hundred and fifty thousand in Pilchard-seines set in Mevagissey Bay; and when tow-netting just outside the entrance to Falmouth Harbour on Dec. 4th, 1902, the writer's boat passed through a dense shoal of undersized fish averaging three to three and a half inches in length. A few are caught every now and then in Pilchard-nets all along the south coast and at St. Ives. It is usually scarce, however, close inshore, but large shoals have been reported during the last eight years by Herring-boats south of the Dodman, off Falmouth Bay, at the mouth of the English Channel, and in the lower reaches of the Bristol Channel. In the opinion of the fishermen, however, its appearance is much too uncertain

and irregular to justify the expense involved in equipping the boats with the small-meshed nets necessary for its capture.

The Herring (*Clupea harengus*, L.) in Cornwall practically reaches the southern limit of its distribution. Till lately, though large quantities were taken off the Cornish coast in autumn and winter, it was not of sufficient importance to maintain a separate fishery. About twenty-five years ago it appeared in increasing numbers around St. Ives, and, as the seine fishery for Pilchards died out there a Herring fishery was gradually developed in its place. During the last few years the average annual export of Herrings from St. Ives has been about two thousand tons. Port Isaac, and to a smaller extent Newquay, are now also centres of regular Herring fisheries. On the south coast large quantities are brought in at Looe and Mevagissey, and recently the schools of Herring have been abundant and regular in their appearance from the Runnelstone to Porthleven. At present the best ground in the south is off St. Loy, both for the size and the frequency of the takes, but during the last three seasons the numbers in and about Mount's Bay generally have been so great that the Newlyn men are looking forward hopefully to the establishment of a regular Herring fishery there. The movement of the Herring from deep water shorewards for spawning purposes and their migration along the coast are somewhat irregular, and greatly affected by the weather and other less recognisable influences. A storm drives them at once into deep water, where they remain till fine weather again tempts them inshore; but even with little or no change in the surface of the sea they may be found some distance out one day and close in on the rocks the next. In some seasons the fish at particular localities spend much more time inshore than usual, or else hug the shore much more closely in passing. At Sennen, near Land's End, for instance, the Herring generally pass some distance out at sea, but during the winters of 1905-6 and 1906-7 large schools were frequently seen within a quarter of a mile of the breakers, but unfortunately the fishermen there do not possess sufficient equipment to enable them to make full use of such opportunities.

There is no spring Herring fishery in Cornwall, but large specimens are taken in the Mackerel-nets in May and June out in the Channel and N.N.W. of St. Ives, and in June, July, and

August by Pilchard drift-nets in deep water. In October numbers begin to put in an appearance on the south coast, though the fishing about Mount's Bay and westward does not generally commence till the middle of the following month. Early in November, as a rule, large schools are found travelling westward along the Bristol Channel past Port Isaac, Newquay, and St. Ives. These north coast fish are usually of medium size, but amongst the November arrivals on the south coast are a number of large Herrings that spawn later than the great majority of the medium and small-sized ones—in February for the most part instead of in December and January—and, as Matthias Dunn suggested, may represent a different strain that comes directly inshore from deep water instead of coasting round the county. This present season, however, Herring of very unusual size have already (Nov. 20th, 1907) been taken in quantity all along the north coast, and the Port Isaac men complain that their packing barrels, made to contain five hundred, will hold no more than three hundred and a quarter. The Herring fishery is most productive in November and December, but is often continued with success into the New Year, though, of course, the percentage of "shotten" fish increases rapidly after Christmas. Fish are at times taken in quantity as late as the month of March out to twenty miles south of the Lizard. Though usually regarded as surface-feeders, Herring are occasionally taken on the bottom in fairly deep water. A number of large full specimens were taken with a beam-trawl in twenty fathoms of water in Falmouth Bay in December, 1901, and several of medium size in thirty-five fathoms about the end of October, 1904. The Sprat (*Clupea sprattus*, L.) apparently fluctuates considerably in its numbers and distribution, for Day, as a result of personal investigation, says it is rare along the south coast of the county, though numerous at St. Ives, whereas during the past four years it has been locally common along the south from Polperro round to the north coast. In 1900 and 1901 it was scarce at St. Ives, and on the south was only obtained in quantity in Mount's Bay, while scarcely a single specimen was captured further east. Probably on account of the irregularity of the supply there is no regular Sprat fishery in the county, except with ground-seines at Saltash and on the shores of the Hamoaze. The Pilchard

(*Clupea pilchardus*, L.) is the most characteristic of Cornish fishes. Though occasionally taken off Exmouth and Seaton, its English range, from the fisherman's point of view, has in the past been from Trevose Head, near Padstow, all round the Cornish coast to Start Point, in Devon. In or about 1883, however, the large shoals that visited the north coast in abundance in the autumn somewhat suddenly ceased to put in an appearance except in a casual way, and though large quantities of Pilchards still appear in September and October off St. Ives, the great diminution in the coasting shoals has caused the large Pilchard seine-fishery there to dwindle into insignificance. Casual fish are taken at the end of May and early in June, but the great schools do not enter the Cornish seas till the middle of June or later. The fish are usually thickest close inshore, though in June and July, 1905, they were remarkably abundant and compact some five miles south-east of the Wolf. All through the summer, as a rule, Pilchards are plentiful and dense in Mount's Bay, and this is naturally the seat of the most extensive Pilchard fishing in the county. In addition to the local boats from Mousehole, Newlyn, and Porthleven, the St. Ives men fish there up to September, when they return to their own waters. During the Pilchard season the colour of the water in the Bay is green and thick so long as the wind keeps in the south-west, but with a northerly or north-east wind for a short time the water gets very clear with less fish (Pezzack). The Mevagissey boats fish, as a rule, off Veryan and the Dodman, and the Looe boats about Donderry and Portwrinkle. This summer, however, for the first time for many years, Falmouth Bay proved to be the best of all the fishing centres, especially in the neighbourhood of Swanpool, though the fish did not come as close inshore as they usually do in Mount's Bay. The Pilchard fishery may come to a close in October, as in 1905, or it may continue through the month of November, and on rare occasions up to Christmas. The average Cornish Pilchard measures eight to nine inches in length, and rarely exceeds eleven, though W. E. Bailey, of Penzance, had a model made of a Cornish specimen that measured fourteen inches. As the Sardines sent to England in oil in airtight tins are simply young Pilchards which appear in great numbers off the French and Iberian coast from May to

October, Cunningham carried out a systematic series of experiments with French small-meshed nets and the French method of fishing in Mount's Bay, Falmouth Bay, Mevagissey, and Looe, to ascertain if it would be possible to establish a Sardine industry in the county. Though the small fish were occasionally found in abundance, their occurrence was much too irregular to justify the outlay on a factory.

The Allis Shad (*Clupea alosa*, L.) is commonly called the Damon Herring in Cornwall. It is often taken in an emaciated condition in the Mackerel-nets in May and June out at sea on the south and west of the county, but shoals are scarce and usually small, except inshore near the estuaries and river-mouths. In the spring of 1900 about three hundred and fifty were obtained in a Mackerel-seine at Looe, and in 1903 it was taken plentifully by the writer on the east side of the Manacles when whiffing for Pollack. Day says it is rare in Mount's Bay and St. Ives, but during the last eight years it has been of frequent occurrence in the west. It is often obtained singly in the Bristol Channel. In May, 1907, a small shoal appeared in Padstow Bay, and a little later several were captured in the Camel at Egloshayle. The Twait Shad (*Clupea finta*, Cuv.) is not so common as the Allis Shad, but a few are taken in the Mackerel drift-nets in May and June every year from off the Dodman round to St. Ives. In 1902 it was plentiful for a few days in the first half of May some miles south of the Wolf. Specimens are occasionally obtained in Pilchard-nets in August, and rarely in September.

A single specimen of *Paralepis coregonoides*, Risso, was driven on the beach alive by Porpoises at Polkerris, near Par, on June 2nd, 1869, and picked up by Matthias Dunn, who sent it to Couch, and he in turn presented it to the British Museum.

The Eel (*Anguilla vulgaris*, Turton) is fairly common but not abundant in the harbours and locally close to the shore along the south, and young ones are often plentiful in many of the streams during the early summer. It is also frequently reported from the north. The Conger (*Conger vulgaris*, Cuv.) is plentiful, and in places abundant, all round the coast, and occurs from low spring tide down to sixty fathoms. It is specially common on "scuddy" ground, but among the most favoured localities in

the county are the Epsom ground, four or five miles south of Porthgwarra, and off the Longships and the Brisons. It is captured chiefly by long-line fishermen with Pilchard or Mackerel as bait. In Cornish waters the fish occasionally attains an extraordinary size. Buckland mentions one obtained by Matthias Dunn that weighed 112 lb., and Bailey, of Penzance, saw one taken off Porthgwarra that measured 7 ft. in length and weighed 105 lb. The largest handled by the writer was $64\frac{1}{2}$ lb., and was taken at the Bizzies, near Portscatho, in July, 1900. Two examples of *Muræna helena*, L., a common Mediterranean fish, are recorded from the county by Couch, the last in 1866. In March, 1897, a specimen $44\frac{1}{2}$ in. long was trawled off the Eddystone, and taken to the Marine Biological Laboratory, Plymouth (Journ. M. B. A. v. 91).

The Sturgeon (*Acipenser sturio*, L.) is a fairly frequent casual along the south coast and out to the south-west. Dunn *f.* says it has been taken in the trammel-nets at Mevagissey. Rice recollects one being captured at St. Mawes, and one about 4 ft. long was taken in a trammel at Porthgwarra in the spring of 1898, the head of which was seen by the writer. The majority, however, are obtained some distance out at sea by the big trawlers. In February, 1900, one 5 ft. 2 in. long was brought in at Porthleven, and in May, 1902, a fine specimen over 7 ft. long was captured by a boat from Newlyn. In 1904 two more were reported from Newlyn. Pezzack says that to his personal knowledge fifteen to twenty specimens have been landed in that district during the past thirty years.

The Blue Shark (*Carcharias glaucus*, L.) appears along the south coast every year, and is often common in the Bristol Channel. It arrives, as a rule, in May or June, and departs in the early autumn, but its movements are greatly influenced by the warmth of the water. It evidently never puts in an appearance till the sea-temperature is over 50° F., and as a rule the hotter the summer the more plentiful does it become. It has been seen as early as the first week in March, and as late as the third week in November. In 1906 it was remarkably common in Mevagissey Bay, and a number were taken with bait and line. On its first arrival it is generally very savage, and is at all times liable to do serious damage to the fishing-gear by rolling itself in

the drift-nets and tearing them with its teeth. In August, 1906, a specimen 7 ft. 10 in. long was killed in Falmouth Bay, and still larger examples have been reported. The Tope or Topper (*Galeus vulgaris*, Flem.) is occasionally taken in Mackerel-nets and on boulders, chiefly during the summer months. On Sept. 28th, 1907, one measuring 5 ft. 2 in. in length was caught near the outer end of the Manacles, where it was ravenously pursuing a shoal of Pilehards. The only specimen of the Hammerhead (*Zygæna malleus*, Risso) recorded from the county was taken at Newlyn in 1834. The Rough Hound or Murgie (*Scyllium canicula*, L.) is common on sandy bottoms, in sandy "lanes," and at times among low rocks along the south coast, and is occasionally taken in the north. It seems to live for the most part at the bottom, two or three miles out at sea, but is often taken in drift-nets after a storm. The Nurse Hound (*S. catulus*, Cuv.) is plentiful along the south, for the most part in deepish waters on a rocky ground. It is evidently a bottom-feeder, and is in places taken with hook and line as a bait for the Crab-pots. It was taken near Sennen in September, 1906, but has been probably overlooked on the north coast. The Black-mouthed Dog-fish (*Pristiurus melanostomus*, Bonap.) was taken at Polperro in 1834. Dunn *f.* reports one he saw in an emaciated condition at Newlyn in the late spring of 1906. The Smooth Hound (*Mustelus vulgaris*, Müller et Henle) has been obtained on the south coast all the year round, but is most plentiful during the months of July, August, and September. On the north coast it has been identified twice during the last eight years. The Porbeagle Shark (*Lamna cornubica*, Gmel.) is often common in deep waters to the south and south-west of the county from early summer into autumn, and is at times so troublesome to the Mount's Bay Mackerel fishermen by dashing backwards and forwards among the fish that they are obliged to draw in their nets and go elsewhere. The Shark itself is rarely caught except with baited lines, for when it gets rolled up in the net it quickly makes a hole the size of its head and slips out without causing very serious damage to the net. It is occasionally reported from the Bristol Channel. Vallentin mentions one caught in St. Ives Bay in a Herring-net that measured 8 ft. 3 in. The Thrasher (*Alopias vulpes*, Gmel.) is taken almost every year in the Mackerel- and

Pilchard-nets ; and in some seasons, notably the late summer of 1899, and the month of October, 1907, several have been seen along the coast about the same time. On Aug. 20th, 1902, a small specimen measuring 4 ft. 2 in. in length was captured near St. Ives, and it has been twice reported from Tintagel. Some of the Cornish specimens are very large. In June, 1874, one 13 ft. long was killed at Scilly. The Basking Shark (*Selache maxima*, Gunn) is a rare visitor from the Mediterranean, notable for its great size, Couch's specimen measuring 31 ft. 8 in. in length. One was apparently seen by the crew of an east coast Mackerel-boat in May, 1900, some miles south of the Wolf, and one was brought into Penzance a few years ago. Three specimens of the Six-gilled Shark (*Notidanus griseus*, Gmel.) have been taken in the county, the last at Mevagissey in 1873. The Picked Dogfish or Spur Dog (*Acanthias vulgaris*, Risso) is the most serious scourge the Cornish fishing industry has to contend against. In some years great crowds appear irregularly in the waters of the south and west, disturb and destroy the shoals of Pilchard and sometimes of Herring and Mackerel, and dash suddenly and recklessly on the fish just as they are entering the net, and not only ravenously devour every single specimen but in their savage onslaught often destroy the net as well. So abundant are they in places that the boats are often compelled to abandon the infested grounds altogether for a time. Occasionally the "dogs" appear in incredible numbers, and are so widespread that the nets are destroyed to an alarming extent, and the continuance of the Mackerel, Pilchard, and Herring fishery under such conditions would be altogether impossible. In the early part of last autumn a steam-drifter shot a boulder, with two thousand hooks, eight miles south-west of the Lizard. The captain says that when the line was drawn there was a Dogfish on every hook, and in some cases three or four savagely clinging to a captured "dog," and in others only the head and gills were left on the hook (Pezzack). All along the Channel from the Eddystone to the Longships, and off Pendean and St. Ives, the shoals last autumn were numerous and dense. On the morning of November 15th the nets of two fishing-smacks in Whitsand Bay, W.N.W. of the Eddystone, suddenly became alive with Dogfish, tearing and rending the meshes in all directions. The efforts to

haul the nets on board having failed, the men tried to tow their tumultuous catch into port, but in a few minutes every fish had torn its way through and escaped, leaving only the tattered nets behind. News, too, had just come to hand that the Mevagissey fleet of sixty boats had returned to its moorings after one of the worst autumn Pilchard seasons on record. On account of the abundance of Dogfish the nets could not be left in the water, and even when a catch was made the Pilchards were devoured, and the nets rendered useless before they could be hauled on board. At every fishing port along the south a similar tale was being told, and the autumn Pilchard fishery last year threatens to be a disastrous failure. The loss inflicted by these predatory vermin of the sea during the past few years has excited considerable public interest in the county, and sundry schemes have been put forward for lessening the evil. One of these is to draw the "dogs" together in some convenient place by an extensive dumping of fish-offal in the sea, and then to blow them to pieces with dynamite. Attempts have also been made to popularise the fish as an article of food under the recently adopted name of "Flake." When skinned and cooked fresh the flesh is firm, wholesome, and palatable, but for various reasons it is most readily saleable when smoked, in which condition its quality and flavour are excellent. With a good and reliable market for the fish, special nets could be prepared for its capture, and its presence might then be turned to profit.

A stray specimen of *Centrina salviani*, Risso, was trawled in twenty-six fathoms near the Wolf, and was described by Cornish (Zool. 1887, p. 221). The Spinous Shark (*Echinorhinus spinosus*, Gmel.) has been frequently obtained along the south coast, twelve county specimens being mentioned by Day. One 5 ft. 4 in. long was brought in by a trawler at Newlyn on Dec. 10th, 1899, and one 7 ft. 5 in. in length was caught with hook and line in Falmouth Bay on July 4th, 1902. The Angel-fish or Monk-fish (*Rhina squatina*, L.) is fairly common in spring and summer along the south, and is occasionally taken on the north coast, especially at St. Ives. It is caught in trammels, on long lines, and at times in trawls, and is used by the crabbers for bait. The Torpedo (*Torpedo nobiliana*, Bonap.) has been frequently captured round the coast from Polperro to St. Ives, and

during the last eight years has been recorded nine times on the south coast, the last in 1906 at Newlyn (Pezzack). On May 26th, 1904, a specimen about $3\frac{1}{2}$ ft. long was found dead near the mouth of the Camel, and in 1905 two were reported and one seen by the writer at St. Ives. The Common Skate (*Raia batis*, L.) is fairly common along the south coast, and evidently local on the north. It may often be taken in some quantity with a boulder on a sandy bottom close to "scuddy" rocks, and is frequently brought in by trawlers. The Flapper Skate (*R. macrorhynchus*, Raf.) has been recorded from the south coast, but is not distinguished from the Common Skate by the fishermen, and has not been seen by the writer. The White Skate (*R. alba*, Lacep.) is locally fairly common in deep waters from Dundererry round to St. Ives in summer and early autumn, and has been obtained near Padstow. Small specimens were very common at Pendower Beach, Falmouth, last year (1906), and were readily captured with hand-lines. The Long-nosed Skate (*R. oxyrhynchus*, L.) is occasionally brought in by trawlers, more especially from the west and south-west. In some years at least it is common on a little patch of "scuddy" ground in forty-five fathoms of water about a mile west of the Wolf Lighthouse. The Shagreen Ray (*R. fullonica*, L.) is mentioned by Couch as rare in Cornwall. On June 21st, 1900, the writer found a specimen 2 ft. 7 in. long in the fish-market at Penzance that had been brought in from Mount's Bay. The Thornback (*R. clavata*, L.) is common from shallow water to twenty-five fathoms on a sandy bottom all round the coast, and locally also in deeper water throughout the summer. In winter it has been taken with a long line at a depth of fifty fathoms. Last year (1906) it was unusually plentiful in the deeper water inside the long sandy bar at Pendower Beach, Falmouth, where it was voraciously feeding on the Plaice, small Turbot, and other flat-fish that are generally to be found there in considerably quantity. The Homelyn or Spotted Ray (*R. maculata*, Mont.) is common on sand, especially in shallow water, along the south coast, but seems to be local on the north. This and the Thornback are the chief edible Rays in the county. The Blonde (*R. blanda*, Holt et Calderwood) is said to be larger and more spiny than the Homelyn, with which it has till recently been confounded. Holt says Couch's description

applies to both, but was based on a specimen of the Blonde. The Painted Ray (*R. microcellata*, Mont.) appears to fluctuate in numbers, but is usually fairly common and in places abundant throughout the summer along the south coast. For the last few years it has been plentiful near Mevagissey. In 1901, and again in 1906, it was common in Gerran's Bay from fifteen fathoms downwards. In 1901 and 1902 it was taken in quantity two or three miles out in Falmouth Bay, and of late it has been common locally in Mount's Bay. The only recognized Cornish specimen of the Starry Ray (*R. radiata*, Don.) known to the writer was brought into Newlyn on Nov. 14th, 1902, from some "scuddy" ground close to the Wolf in about forty-five fathoms of water. It measured $16\frac{1}{2}$ in. in length and $12\frac{1}{3}$ in. in breadth. The Cuckoo Ray or Sandy Ray (*R. circularis*, Couch) is frequently taken on sandy and "scuddy" ground in deep water along the south, and off St. Ives. It has been taken lately off Mevagissey, at Portscatho, off Pendower Beach, and has been reported from Cove-rack, off Praa Sands in Mount's Bay, and twice from St. Ives; but it does not seem to be at all prevalent in any of these localities. The Sting Ray (*Trygon pastinaca*, L.) is a frequent casual from shallow water downwards in sand, and especially in muddy sand, all round the coast from Donderry to Padstow. The largest Cornish specimen seen by the writer measured 2 ft. 8 in. in length and 1 ft. 8 in. broad, and was taken by hook and line in twenty-three fathoms in Falmouth Bay. On Aug. 2nd, 1901, five small ones were taken at the mouth of Helford River. Couch says the Eagle Ray or Whip Ray (*Myliobatis aquila*, L.) has once occurred in Cornwall. Several specimens have been taken off Plymouth (Day).

The Sea Lamprey (*Petromyzon marinus*, L.) is apparently scarce. On May 17th, 1902, two were seen and one gaffed in Fowey Harbour, and on April 10th one was taken at St. Mawes. The Lampern or River Lamprey (*P. fluviatilis*, L.) is frequently taken in the Lynher and its tributaries, but does not seem to be known in the west of the county. The Mud Lamprey (*P. branchialis*, Cuv.) is common in almost all the rivers of Cornwall. Because of its great toughness it is much in request as a bait for Whiting-Pollack. The Hag-fish (*Myxine glutinosa*, L.) is described by Cornish as rare, and apparently the only county

record is of a specimen found by Cocks in the stomach of a Cod at Falmouth. The Lancelet (*Branchiostomma lanceolata*, Pall.) is evidently very local in sand down to forty-five fathoms all along the south coast, but cannot be considered rare. In a favoured spot in twenty-five fathoms in Falmouth Bay eleven were obtained at a single cast of the dredge in 1904, and specimens have been taken on each of three subsequent visits to the same place. On the north coast single specimens have been found at St. Ives and at Padstow. Vallentin found young larvæ 4 to 6 mm. long fairly common in St. Ives Bay in August, 1905, but in spite of careful dredging was not successful in finding its permanent habitat.

NOTES AND QUERIES.

AVES.

Eggs of Red-backed Shrike (*Lanius collurio*).—Your correspondent's suggestion in regard to the variation in the eggs of *Lanius collurio* (Zool. 1907, p. 429), to my mind, is entirely wrong, contrary to my own experience, and to what I think is now generally accepted as a concrete opinion, *viz.* one bird, one type. If Mr. Mussel-White will take a trip to Bempton when the cliffmen are "egging," and get into conversation with some of them, they will convince him on this point in a very short time. They know from a very lengthy experience that in many cases (unless anything has happened to the bird) the same type of egg will be found on the same ledge year after year; so well do they know these particular spots that they will tell you what type of eggs they expect to bring up. Mr. J. M. Goodall has among his exceedingly fine series of eggs of Guillemot (*Uria troile*) the production of several birds extending over a number of years, and taken from the same ledges frequented by those particular birds. In each case they are all absolutely identical, and obviously laid by the same females, and would, I venture to say, convince the most sceptical oologist on this all-important and most interesting problem. Those who have formed a large series of the eggs of *U. troile* will appreciate the difficulty there is in finding two eggs identical in ground colour and marking. It is therefore a comparatively easy matter to trace those which are the produce of one female; though they may differ slightly in marking the general character is maintained. I have proved this conclusively in regard to many species (including *Lanius collurio*). Among them I may mention Black-headed Gull, Thrush, Nightingale, Nightjar, Cuckoo, Kentish Plover, Herring-Gull, Tree-Pipit, Blackbird, Kestrel, Redbreast, Lapwing, Richardson's Skua, Stone Curlew, &c. With regard to the Red-backed Shrike, it is well known that the eggs of this species vary considerably, but nevertheless are confined to four distinct types (not varieties). There are of course intermediate, modified, and extreme types, which may be, and should be, termed varieties, or, strictly speaking, varieties of types. In a large series of these eggs it is quite easy to detect these four

distinct types. The majority of writers are in error in regard to the number and description of these types, some of which are omitted altogether, or very inadequately described, Seebohm and Charles Dixon alone mentioning and accurately describing them, though Seebohm only figures two. They are well figured in 'Oologia Universalis Palæarctica,' George Thrause, part v., and in 'Eggs of the Birds of Europe,' H. E. Dresser, part viii. In the latter splendid work they are beautifully figured, but unfortunately Mr. Dresser has apparently left out the buff type. They are: (1) pure white to pale yellow; (2) palest pink to rich salmon; (3) pale green to greenish white; (4) pale brown to rich buff. I have placed them in the order to which they occur numerically. No. 4 type is the one to which I refer as having been inaccurately described or omitted altogether, chiefly, no doubt, owing to its rarity. For the present purpose I have thought it sufficient to refer only to the ground colour, which is, to my mind, the most important and only correct way of distinctly separating the types, not only of this species but of nearly, if not all, others. Now, it is quite obvious to me that the bird spoken of by Mr. Mussel-White as having produced the grey type in 1906 was not the same bird that produced the red type in 1907. Were his contention right, would he claim that in 1908 this bird would produce another type?—say, the green type—and finally, in 1909, it would produce the buff type, thus having produced the four types in four consecutive years. Now we come to the crucial point—is the bird to commence producing these four types over again, which it should be expected to do if Mr. Mussel-White's theory be correct? This is, I think, most improbable and quite contrary to the accepted rule of Nature. I am quite convinced in my own mind that the one type is perpetuated by one female (even though she may change her mate)—at least, all the evidence I have accumulated points in this direction—and the more experienced I become in the science of oology the more convinced I am, every season bringing fresh evidence in support. I will quote one case in point which has helped that conviction (in addition to the one already quoted). In the spring of 1906 I received from a correspondent in North Devon three eggs of the Tree-Pipit (*A. trivialis*) of a most uncommon variety, intermediate between the red mottled type and the red spotted or blotched type, which I had never seen before among the great number of clutches brought to my notice. This year I received, *from the same correspondent and locality*, a clutch which is identical in every respect and cannot have been produced by any other than the same bird. Speaking of eggs generally,

the age of the bird has nothing whatever to do with the coloration, except in regard to the intensity or modification of such, the predominating pigments always remaining the same. This of course only applies to normal conditions, and not to those birds whose condition has become abnormal and produce varieties or freak eggs. Food, I am inclined to think, has a certain influence on the colours of eggs, but not in regard to the actual and set types. Climatic conditions I do not find influence in the smallest degree the normal and set types, eggs from the Continent being identical in every respect with those found of the same species in this country, though in size and shape they may differ, but only to an almost imperceptible degree. Why Mr. Mussel-White should think that the Cuckoo (*C. canorus*) should perpetuate the same type of eggs and not the Red-backed Shrike I cannot say, though fully endorsing all he says in regard to *C. canorus*; of this I have in my series of Cuckoo's eggs sufficient evidence which to my mind is conclusive. As wonderful as it is (taking into consideration the risks entailed in migration) that certain birds return to the same neighbourhood annually, it must be remembered that after all they are simply being guided by their hereditary natural instinct. — PERCY F. BUNYARD (57, Kidderminster Road, Croydon).

Great Grey Shrike near York.—A fine specimen of the Great Grey Shrike (*Lanius excubitor*) was caught by two birdcatchers when "setting" limed twigs for Linnets at Strensall, near York, on Nov. 28th last. The Shrike, caught by the wing, struggled fiercely, and savagely bit at its captors, who, not knowing what the bird was, willingly disposed of it alive for a small sum. The purchaser kept it two days, endeavouring to get it to eat mice, which it readily killed but would not eat, and through lack of knowledge of Shrike's food on the part of its possessor the bird died of starvation, the preserved remains being added to the collection of Mr. Harry Dale, of York. — SYDNEY H. SMITH (20, Park Crescent, York).

Richard's Pipit (*Anthus richardi*) in Ireland.—On Nov. 22nd last a birdcatcher brought me a live bird taken in his net the previous night at Lucan, Co. Dublin, whilst netting Sky-Larks. As the bird had the appearance of a large Pipit, I had little difficulty in recognizing it from the description in Saunders's 'Manual' as a Richard's Pipit. Some idea of its rarity in this country may be estimated by the fact that the supposed occurrence in Ireland was in 1824, and that was considered so doubtful that it was removed from the Irish list by Messrs. Ussher and Warren in their work on 'The Birds of Ireland.'

This capture places the bird once more beyond doubt on the Irish list. It was seen in the flesh by Mr. R. M. Barrington.—W. J. WILLIAMS (2, Dame Street, Dublin).

Ospreys in Co. Sligo.—I regret to record the capture of two Ospreys (*Pandion haliaëtus*), within a few miles of one another, in Co. Sligo during the month of November last. The first was captured by a boy, the second was shot a fortnight after; they were both in immature plumage, and doubtless the offspring of the birds so rigidly protected in Scotland.—W. J. WILLIAMS (2, Dame Street, Dublin).

Night-Heron in Ireland.—An immature bird of this species (*Nycticorax griseus*) was shot on Lord Darnley's estate in Co. Meath on November 21st last. It was in fat condition and perfect plumage. Stomach empty when captured.—W. J. WILLIAMS (2, Dame Street, Dublin).

American Wood Duck in Oxfordshire.—Early in last December Mr. R. W. Calvert saw hanging up in Oxford Market a strange Duck, which he was informed had been shot on Otmoor—the great resort in Oxfordshire of wildfowl—on the 4th of the month. He most kindly purchased it and had it sent to me. It proved to be a specimen of the Wood (or Summer) Duck (*Æx sponsa*) in the plumage of the female. This beautiful Duck is one of the American species which is not admitted to a place on the British list, on the grounds that it breeds on ornamental waters in this country, and that young birds which are left full-winged sometimes wander away. But it has a wide range in North America—from Hudson's Bay to the Gulf of Mexico; and, according to Mr. D. G. Elliot, it is one of the earliest of the water-birds to start on its southern migration from the northern part of its habitat . . . "so anxious does it seem to be to get away from even the suspicion of winter" (cf. 'The Wildfowl of North America,' p. 87). The example in question was in good condition and in beautiful plumage, and weighed 17 oz. when it came into my hands.—O. V. APLIN (Bloxham, Oxon).

Wild Ducks near Lincoln City.—On the morning of Dec. 6th, 1907, I passed a sheet of water lying within a mile of the centre of Lincoln City, and, seeing that the surface was dotted over with wildfowl, I turned a strong pair of prism-glasses upon the birds, and saw that they consisted of Coots and no fewer than seven species of Ducks. The species and approximate numbers were as follows:—Mallard and Duck, fifty pairs; Teal, twenty-five pairs; Shoveler, three ducks; Wigeon, one duck; Tufted Ducks, ten, only one old drake; Pochard, three pairs;

Golden-eye, three, ducks or immature. Many Hooded Crows were flying about, and hundreds of Lapwings. The lake, known as the Ballast Pit, lies close to a railway embankment, and is perhaps half a mile in extreme length, being shaped like an obtuse-angled triangle. The day was bright and frosty, there being a little ice on the water, and the wind was light from the south-east. It was interesting to find so many species of wildfowl close to a populous city.—F. L. BLATHWAYT.

REPTILIA.

The Smooth Snake (*Coronella austriaca*) in Devonshire.—As there appears to be no record of the occurrence of the Smooth Snake in Devonshire, it may be worth while to note the recent capture of an example near Sidmouth. My friend and pupil, Mr. H. G. Oliver, was walking along a cliff-path at Weston Coombe, about three miles east of Sidmouth, on Sept. 14th last, when he disturbed a specimen basking in the sun by the side of the path. It at once tried to make off, but was partially disabled by a blow from a walking-stick. On being picked up it bit savagely at the hand of its captor; it was with some difficulty got into a sandwich-box and so carried home, being subsequently transferred to a bottle of alcohol. The specimen was brought to Nottingham for my inspection, and is an adult in good condition, measuring nineteen inches in length. — J. W. CARR (University College, Nottingham).

NOTICES OF NEW BOOKS.

Final Natural History Essays. By GRAHAM RENSHAW, M.B.,
F.Z.S. Sherratt & Hughes.

THIS is the third and final volume of Dr. Renshaw's natural history essays. It is solely confined to mammals, and refers to twenty-four different species of animals from various parts of the world. The volume is both popular and scientific; the first element is found in an eloquently written dream or reminiscence of the species in its original environment, the scene sometimes laid in prehistoric times; the second and very prominent feature is to be found in much bibliographical information as to the first description, status, and distribution of the creature. Nearly all the species are well illustrated from photographs taken by the author.

Many of the species which form the studies for these essays are, alas! approaching perilously near extinction, the lines which conclude the volume being almost too suggestive:—

“And I beheld and saw them one by one
Pass, and become as nothing in the night.”

With some ghosts of their former selves, such as the South African Bontebok (*Damaliscus pygargus*), Dr. Renshaw has rendered distinct service by recording the number of specimens brought to Europe, and their location.

We are sorry to read that these are final essays, but finality is only an abstract term, and there is an element in the papers to which Dr. Renshaw will find it difficult to write *finis*. We shall therefore look forward to “New” or “Supplementary Essays” from the same writer, and the promise, we think, can be safely made that they will be as favourably received as their predecessors. These pages mark a very distinct advance on the general literature now so abundant on natural history topics.

We would rather have found an index than “Press Notices” at the end of the volume.

How to Sex Cage Birds (British and Foreign). By A. G. BUTLER, Ph.D., &c. "The Feathered World" Publishing Office.

THE opening words in the introduction to this very useful volume may be taken as its justification:—"Amongst technical ornithologists it has been a custom, much to be deplored, to describe all birds in which the sexes do not exhibit marked differences in colour of plumage, or well-defined external ornamentation, as follows: 'Female similar to male.'" In America more minute examination is now being made with unsexed preserved skins, and keys being sought to discriminate the sex of same. This question has for some years engaged the attention of Dr. Butler, and it is a study for which he was particularly well equipped. Not only is he a well-known aviculturist, and has had a large number of live birds both British and foreign under his constant observation, but for many years he was in charge of the Lepidoptera at the British Museum, where he was recognized as having acquired a remarkable keenness in the detection of minute differences among butterflies and moths. This faculty has now placed him in an excellent position for the discrimination of the slightest sexual characters in the plumage and superficial structure of birds. He has also made prolonged examination among the skins contained in the wonderful collection of the British Museum, and has compiled sexual descriptions, where available, from much of the ornithological literature. The result is this small and well-illustrated volume, which will long remain a text-book on the subject. In some cases the differential equation will not appear so clear to those who have not the trained eyes of the author for the lesser distinctions, which are not infrequently difficult to express in words. A shepherd is said to individually recognize his sheep—another acquired faculty which is difficult to explain in words, and requires personal tuition and an apt pupil. Dr. Butler, however, has given us a book which clearly sets forth a large number of clearly apprehended sexual differences, and as to a considerable number of others he gives the key for a more difficult identification.

This small volume is amply illustrated, and contains four coloured plates.

The Useful Birds of Southern Australia, with Notes on other Birds.

By ROBERT HALL, F.L.S., C.M.Z.S., &c. T. C. Lothian,
Melbourne & Sydney.

THIS book is for the horticulturist a vindication of a number of common Australian birds. Their depredations are shown to be in the main useful, their food that of the gardener's enemies, their habits innocuous. Of the Yellow-rumped Tit (*Acanthiza chrysorrhoa*) we read:—"Each Tit that owns a house in an orchard is worth more than its weight in gold, so valuable are the services of this insectivorous genus. On no account whatever, except for strictly scientific purposes, should this bird be killed or driven from a garden." On the other hand, introduced species may become noxious. "Australia has no bird that proves so disastrous to rural industries as the introduced Sparrow. A law for its stringent suppression should be a satisfactory one." The European Starling is recognized as "come to stay. Being gregarious, its every action for good or for ill is one of whole measure. . . . Up to the present time the bird as a help-mate to the grazier and farmer is a valuable one. To the orchardist the menace is a serious one." In the introduction we are told:—"It is a problem for the future to decide whether a war of suppression shall be waged against the Starling, and it behoves all who have the farming interests at heart to closely watch its ways. Remember the Rabbit and the Sparrow!"

Apart from the avine economical standpoint, this small and fully illustrated volume tells us much of the life-histories of the species which are included in its category, the details given being not those of a compiler but the observations of a well-recognized Australian ornithologist. Our space will not allow a long quotation, otherwise we should like to print the summary given of a paper by Mr. M'Alpine on the relations between the Lory and the fungus of the citrus tree. Mr. Hall has written a useful book on an important subject.

EDITORIAL GLEANINGS.

A PAPER was recently read at Hampstead by Mr. W. F. Kirby, F.L.S., &c., on "Ants from a Social and Theosophical Standpoint." Mr. Kirby commenced his paper by remarking that while much that is taught as Theosophy is true, much is highly probable and other statements cannot at present be verified, and must be treated as useful working hypotheses, to be verified or disproved later on. Among these was the statement that several distinct lines of evolution were running their course in this world parallel with our own. He thought it more probable that ants belonged to one of these than to our own line of evolution. There are four groups of insects which stand out as prominently from the rest of the insect world as does man from the larger animals. These are bees, wasps, termites or white ants, and ants, the last of which are the most interesting. He then spoke of the contrast between ants and ourselves; how they emerge from the eggs as helpless maggots, and are cared for by the working members of the community (which are sterile females) till they reach their perfect state, when they are born with all their working tools, including brushes and combs, and are able to take their share of the work of the community. Their senses are different from ours, for there is reason to believe that they see colours which are invisible to us. Some of their communities are so vast that a single colony might contain a much larger number of individuals than the whole human population of the globe. Most communities own large herds of cattle (plant-lice, caterpillars of blue butterflies, &c.), and pets, whilst others subsist by the chase or by growing corn or mushrooms. Generally speaking, ants are very patriotic; and there are no unemployed, for in an ant's nest it is each for all and all for each. But strangers from another nest are often ruthlessly slaughtered, while wars between one nest and another are not uncommon. Still more remarkable are the slave-making ants, some of whom have become so degenerate that they will actually die of starvation in the midst of plenty unless they have a slave to feed them. They are also annoyed by various enemies and parasites, among others by a small cricket, which is in the habit of slyly

nibbling at an ant till she turns round, when the cricket bolts. In conclusion, Mr. Kirby said that our proceedings would probably appear far more irrational to beings proportionately larger than ourselves than those of ants do to us.

Large Fish Caught in 1907.—Exceptionally large “game” fish have been killed, notably a splendid Salmon of $61\frac{1}{2}$ lb., caught in the Tay below Perth by Mr. T. Stewart; a 50 lb. specimen from the Awe, at Taynuilt, landed by Dr. Child; and a 47 lb. Salmon, secured in the Earn, another Scottish river, by the Hon. H. Stonor. Over thirty years have elapsed since the Tay yielded to rod and line such a large Salmon as that recorded above. In Norway there has also been caught a 62 lb. Salmon.

The Trout landed have included the record fish for London waters—the 18 lb. specimen secured by Mr. J. Brigg in the New River at Harringay—though the best Trout from the Thames only scaled 8 lb. 3 oz., a falling off in the weights of previous years. The Thames fish was secured by Mr. P. Green, President of the London Anglers’ Association. Trout of 17 lb. 4 oz. (Lakes of Killarney), 14 lb. 12 oz. (caught in Ireland by Mr. Buckingham, Gresham Angling Society), 13 lb. 3 oz. (taken by Mr. H. Currell, Jun., of Hertford), $13\frac{1}{2}$ lb. (secured at Lough Corrib by Captain C. E. Bruce), and $12\frac{3}{4}$ lb. (taken in the Frome at Dorchester by the Rev. S. E. V. Filleul) have been secured. Of the Grayling creeled, one of 3 lb., taken by Mr. Zerfass (Gresham Angling Society) from a Hampshire stream, heads the list.

In Pike the Thames has yielded the finest river specimen of the year, taken by Mr. E. J. Bowles at Oxford; it scaled 29 lb. A monster Pike of 34 lb. is also recorded from a Wiltshire lake, landed by Mr. Angerson, of the Bristol Golden Carp A. A. The Tweed has yielded one of 31 lb., the Nene a 24-pounder, and the Sussex Rother a $22\frac{1}{2}$ lb. Pike.

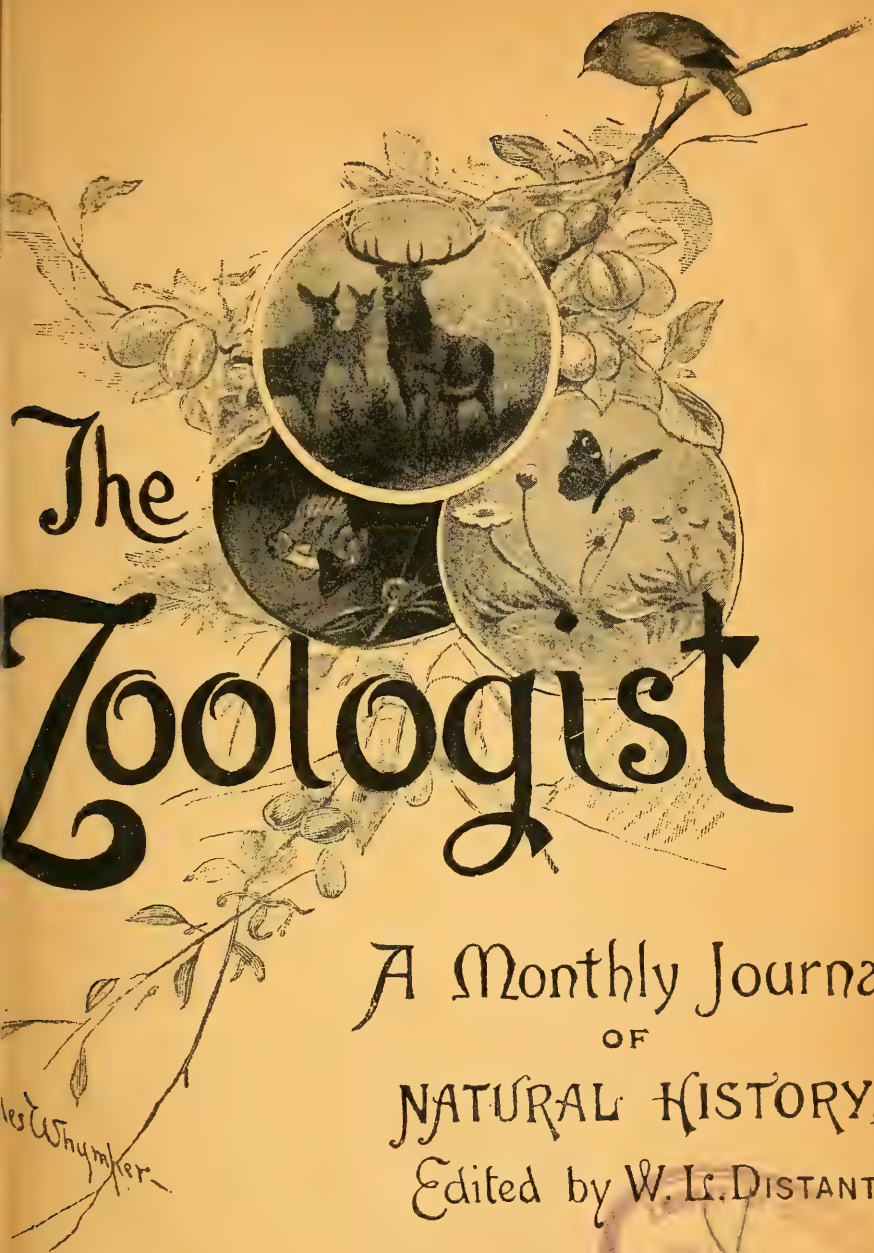
A couple of 6 lb. Chub hail from Hampshire, landed by Messrs. E. J. Walker (Piscatorial Society) and T. W. Bowman (Gresham); and Mr. Locksmith has taken, near Weybridge in the canal, the largest Carp known for many years; it scaled $19\frac{1}{2}$ lb. A splendid Carp of 14 lb. 8 oz. also fell to the rod of Mr. C. E. Cooke, in Twickenham Deep.

Some fine Roach have been basketed, including specimens of 2 lb. 9 oz., 2 lb. $8\frac{1}{2}$ oz., and 2 lb. 5 oz., the two former caught in the Arun by Messrs. P. Allum and A. L. Woode, and the latter taken in

the Thames at Shepperton by Mr. R. Smith. Large Dace have also been captured, including one of 1 lb. 6 oz., taken in a Christchurch mill-pool, and another of 1 lb. 1 oz., secured in Walton's river—the Lea. In merit, size for size, these Dace equal a 60 lb. or 70 lb. Salmon. The largest was caught by Mr. Hullett.

One of the heaviest Bream brought to bank was taken in the Colne by Mr. Gerken, a member of the West Green A. S., Tottenham; it scaled 7 lb. 1¼ oz. For size and quality the Thames has again furnished the largest Barbel of the season, this being a specimen of 10 lb., taken by Dr. Macroy at Sunbury, and fine Perch of 4 lb. (Old Windsor) and 3 lb. (Reading) are also recorded from this river.—*Evening Standard and St. James's Gazette*, Jan. 1st, 1908.

Voracity of the Chub.—"A friend once brought us a big Aire Chub to set up, weighing 4 lb. 2 oz. When opened it was found to contain a half-grown Water-Vole, which had no doubt been pulled under when crossing the river. Nothing in the shape of food seems to come amiss to the swarms of this fish, which thrive somehow in the sewage-contaminated parts of the Aire within the limits named."—W. H. Whitaker, "The Fishes of Upper Airedale" (*Bradford Scientific Journal*, July, 1907).



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THE ZOOLOGIST

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ON THE PERFORATIONS OF MARINE ANIMALS.

By Professor McINTOSH, Gatty Marine Laboratory, St. Andrews.

IN former papers* special groups of marine forms which perforate have been dealt with. On the present occasion a general sketch of the subject as represented by the various types of invertebrate marine animals which bore in rocks, shells, sand, and other media will be given. The burrowing of marine forms on our shores is a familiar feature to every zoologist. Moreover, scarcely a dead shell can be dredged from the sea-bed that does not present perforations of boring sponges, the slightest force, in well-marked cases, sufficing to break the thin superficial crust concealing the yellowish substance of the sponge in the interior. Multitudes of living Oyster-shells are affected in the same manner, so that the Whitstable Oyster Company and others have been greatly concerned about their depredations, which, however, are not on the whole very serious. Further, these perforating sponges often perform their work of destruction in the most regular and beautiful manner, leaving arborescent patterns with necklace-like dilatations, or a branching pattern like a Gorgonian, to mark their progress in the shell. In the same way the surface of the limestone rocks of the southern shores is riddled with these sponges (*Cliona*). So far as at

* Ann. Nat. Hist. 4th ser. vol. ii. pp. 276-295, plates 18-20, October, 1868; and 'Marine Invert. and Fishes of St. Andrews,' pp. 58-60, 1875.

Zool. 4th ser. vol. XII., February, 1908.

present known, sponges bore only in calcareous substances, *viz.* in limestones, shells, nullipores, and corals, but their exact method of operating is still involved in mystery. Prof. R. Grant seems to have been one of the first to notice that *Cliona* formed its own tunnels, and Duvernoy followed him in describing a foreign species. Nardo,* again, subsequently gave an account of the perforations of the shells of mollusks, and Michelin further pointed out the dendritic pattern of such excavations. McCalla (1849) also knew that *Cliona* was destructive to shells. Dr. Bowerbank, the able author of the 'British Sponges,' held that they never perforated either rocks or shells, but only took possession of cavities bored by other forms, and that he had found the sponges only partially filling the chambers in the calcareous rocks on the southern coast. Some hold that the soft animal jelly or protoplasm of the sponge is the agent, while others, such as the late Albany Hancock, maintain that it bores by aid of its spicules. One or two, again, like Dr. Bowerbank, have insisted that the sponges do not perforate, but inhabit the galleries of other forms. Thus, some years ago, an able zoologist considered that the so-called boring sponges only occupied the tubes of annelids, and forwarded many specimens with a view to substantiate this opinion. From dredgings off the Channel Islands a very thin shell (lower valve of *Anomia ephippium*), in which translucent medium a *Cliona* had established itself, was forwarded to the zoologist. When held up to the light the beautiful dendritic patterns made by the sponge were clearly outlined, the oscula of the sponge, moreover, projecting from the widened areas. Now this shell was so thin (much thinner than that of *Placuna placenta*) that no known annelid could form a lodgment in it. The zoologist did what, perhaps, was most judicious, *viz.* avoided all subsequent allusion to the matter. A considerable time ago the subject was investigated by Nassonow,† who cultivated young boring sponges on thin transparent calcareous lamellæ. The larvæ, after a free stage, settled on the plates, a rosette-like mark appeared, and the sponge gave off thin processes, which passed into the substance of the plate and followed the contour lines of the rosette. This penetration happened

* 'Atti degli Scienziati Italiani,' p. 161, Pisa, 1839.

† Zeitsch. f. Wiss. Bd. 39 (1883), p. 295.

before the spicules of the sponge were developed. Nassonow thought both chemical and mechanical agencies were employed, but he could not demonstrate the presence of an acid.

The action of sponges on calcareous organisms in the ocean is a widespread and important one in disintegrating the innumerable shells, corals, and nullipores on the floor of the sea, as well as the calcareous rocks at its margin; and whether this ceaseless destruction is caused by intrinsic or extrinsic agencies (*e.g.* by the aid of carbon-dioxide in sea-water), there can be no doubt as to the magnitude of the operations. It is, moreover, noteworthy that, so far as known, only calcareous media are affected by boring sponges.

Burrowing in hard substances seems to be rare in the Cœlenterates, though *Peachia*, *Edwardsia*, and *Cerianthus* bury themselves in sand, clay, and mud. Prof. Haswell* mentions a minute Actinia which occupies cavities in a *Cellepora* much deeper than the length of the polyp itself. In most cases the orifices are furnished with a low projecting rim, and frequently two unite internally. This may, however, be an instance of the growth of the Polyzoan round the Actinia, and not an instance of true perforation. Whether the case of the Anemones in holes of the rocks at Jamaica differs from the foregoing in so far as perforation is concerned remains for further investigation.

Turning to another and somewhat higher group of marine animals, *viz.* the Echinoderms, it is found that at least one species—the Purple Sea-urchin (*Echinus lividus*)—excavates considerable cavities, in which it lodges, in rocks—sometimes in rocks so hard as gneiss and granite. Authors assign to the teeth the main agency in the perforations, yet the cavities are somewhat smooth.

J. W. Fewkes,† after a careful examination of the perforations of *Strongylocentrotus drobachiensis* on the coast of Grand Manan, United States, considers that the excavations are due to the motions of the animals produced by waves and tide as well as to teeth and spines. He also thinks that they play some part in the formation of pot-holes. Prof. Cragin in the same volume,‡

* Proc. Linn. Soc. New South Wales, vol. vii. p. 608, 1882.

† ‘American Naturalist,’ vol. xxiv. p. 1, 1890.

‡ *Ibid.*, p. 478.

however, points out that similar urchins wedge themselves in most firmly if they find force applied to them, so that the wave-action is doubtful.

The Annelids, again, include many forms which ceaselessly bore through sand (like the lobworm), earth (as in the case of earthworm), peat, and many soft media. Others penetrate aluminous shale, sandstone, limestone, shells, and various solid substances. Each form, moreover, fashions a characteristic tunnel in the rock, so that the particular borer may in most cases be determined, even after the dissolution and disappearance of the animal. They do not, however, bore in wood, and though pieces of telegraph-cable have frequently been forwarded with accompanying annelids as the depredators, in no instance has it been deemed prudent to connect them with the injury. Some authors have a different opinion, but the misapprehension has arisen simply from the presence of formidable calcareous jaws in annelids found lurking in holes which have been drilled by other forms. In short, it is a revival of the ancient notion which, assuming the shells of *Teredo* to be its teeth, credited it with the habit of eating its way into timber. In the same manner it has been supposed that *Polydora* and other boring annelids have found their way between the valves of Oysters, and subsequently have been enveloped by the shelly secretion of the mollusk.

Certain members of a group somewhat allied to the Annelids—viz. the Gephyreans—also bore in calcareous substances, such as shells and limestone rocks, as well as more generally in mud and sand. Such include the little *Sipunculus* of the British shores, and which at St Andrews makes cavities in sandstone; *Bonellia* of the more southern waters; and *Thalassema*, which Dr. Farran* found in limestone near Dungarvan, in company with *Gastrochæna*. Other members of the group are partial to boring in sand and tough clay, or muddy clay.

Certain forms allied to the Polyzoa likewise perforate calcareous rocks. Thus *Phoronis*, a form which in its larval state has relationship with higher types, has been found in tunnels in chalk, and so far as could be made out it appeared to have formed them. It is interesting that *Phoronis* often occurs in

* Ann. Nat. Hist. 2nd ser. vol. vii. p. 156.

great numbers in the tough mucous sheaths in which an Australian *Cerianthus* lives.*

The burrowing powers of all the foregoing forms would seem to be well calculated to secure protection for themselves, but there can be little doubt that they also perform an important function in the disintegration of dead shells, and in corroding the surface of calcareous and other rocks. While they thus act beneficially in regard to dead shells, the same cannot be said with respect to their interference with the living; for as soon as the perforations of either annelid or sponge touch the internal surface, the Oyster or Limpet, for example, secretes layer upon layer of the nacreous substance in order to shut out what is evidently an irritating intruder, and thus the thickness of the shell is often greatly increased.

So far marine animals have been dealt with which bore into various earthy substances, but others perforate wood and allied materials, like the Crustacea, whilst the Mollusca also do so, and likewise bore in rocks varying in hardness from chalk to granite, as well as make holes in other shells.

Boring and burrowing are common features amongst the Crustacea. Thus, to take them in their order, certain Cirripedes, e.g. *Alcippe lampas*, *Cryptophialus*, and *Lithotrya*, perforate shells, the former attacking the columella or axis of the shell, while the boring sponge enters the exterior surface and rapidly spreads over the whorls, so that between them the shell soon crumbles to fragments and disappears. Its discoverer (Mr. Hancock) did not think *Alcippe* bored by its shelly plates, though the perforations might "result from a solvent, or from the application of minute cutting bodies on a highly contractile, soft, and pliant surface."† Darwin‡ thought the burrowing of *Lithotrya* was mechanical, the peduncle being studded with calcified heads and star-headed spines, which form a rasping surface, and are worn away, to be replaced next moult. "It [burrowing] is effected by each layer of shell in the basal attached disc overlapping in a straight line the last formed layer, by the membrane of the

* Prof. Haswell, Proc. Linn. Soc. N.S.W. vol. vii. p. 341.

† Ann. Nat. Hist. 2nd ser. (4), p. 313, plates 8 and 9, 1849.

‡ Monogr. Cirripedia, pp. 336-348, 1851.

peduncle and the valves of the capitulum having excellent and often renewed rasping surfaces; and, lastly, by the end of the peduncle (that is, homologically, the front of the head) thus roughened extending beyond the surface of attachment, and possessing the power of slight movement." Many crustaceans perforate sand, clay, mud or sandy mud, while two at least (*Chelura terebrans* and *Limnoria lignorum*) are well-known destroyers of wood.

The first of these (*Chelura terebrans*) is a form less familiar to Scottish zoologists—especially those on the eastern shores—than to our southern colleagues. It is abundant, however, on the southern and western coasts and in Ireland, its range likewise extending to many parts of Europe and the United States. A similar form (*Chelura pontica*) is also described by Czerniavsky as occurring along with *Teredo* in the Black Sea, while elsewhere it is generally associated with the other form, *Limnoria*. In xylophagous powers it is even more destructive than the latter, since its excavations in timber are considerably larger and more oblique, the wood being ploughed up rather than bored into, so that the surface thus undermined is rapidly washed away by the action of the sea. In one of the many beautiful memoirs written by the late Prof. Allman, formerly the distinguished occupant of the Chair of Natural History in the University of Edinburgh, a description is given of these crustaceans in the timber-piles of the jetty of the Harbour of Kingstown, near Dublin. It has been calculated that *Chelura* will destroy a piece of Memel timber thirteen inches square in less than ten years, working from the level of the mud almost to the height of neap-tides. It is believed that the mandibles of the animal enable it to perforate the moist timber, which it swallows. The mouth-organs consist of an upper and a lower lip, a pair of mandibles, and two pairs of maxillæ. Between the spines and the base of the mandibles is an oval elevated surface marked with transverse ridges, which are again crossed at right angles by delicate striæ. Prof. Allman considered that this eminence constitutes a very efficient grinding surface. The last pair of appendages at the tail of the animal are remarkable in size and length, and probably aid in effecting various movements within its chamber, as well as in leaping (after the manner of a Springtail) when placed

on a flat surface. Its movements in the water are very active, and it swims chiefly on its back.

The second form, *Limnoria lignorum* (the Gribble, as it has been popularly called), is an Isopod,* and closely allied to the *Sphæromidæ*, which occur in crevices of rocks, especially on the southern (Channel Islands) and western shores (Outer Hebrides). Though this form (*Limnoria*) must have been familiar to marine observers from a very early period, it was fully described by Dr. Leach only in 1811, when Mr. Robert Stephenson, the celebrated engineer, found it burrowing most destructively at the Bell Rock in the large beams of Memel fir supporting the temporary beacon in which he and his assistants resided. The sides of these beams had been charred and coated with pitch, but the ends resting on the rock had been overlooked, and there *Limnoria* began its operations. Other logs of pine were reduced at the rate of about an inch a year, and the house-timbers were so much destroyed that many stood clear of the rock, supported only by the iron bolts and stanchions. Since its ravages at the Bell Rock brought it under the notice of men of science it has been found very generally distributed on our shores from Shetland to the Channel Islands, and it is common in European waters. It attacks all kinds of submerged wood, such as piles facing the wharves, sunken wrecks, stakes of Salmon-nets, and indeed all unprotected wood. The late Dr. Coldstream, of Leith, the author of an excellent account of the animal, mentions that, in 1825, so extensive were the ravages of *Limnoria* that many of the piles of Trinity Chain Pier had to be replaced after four years' service, and studded all over with broad-headed iron nails from the base to the limit of high-water mark. The same plan was adopted in extending the pier at Leith on wooden piles four years afterwards (at a cost of £1000, the whole pier being £30,000). At Devonport Dockyard at this moment it is more troublesome than the *Teredo*.

Like the foregoing species, *Limnoria* uses its mandibles for burrowing, and the particles of wood are swallowed. It generally chooses the softer places, shunning the knots and hard lines of wood. It even avoids the New Zealand pine (Cowdie). As

* An elaborate and well-illustrated Report on this form was published by the Netherlands Commission in 1893.

already mentioned, it is effectually kept out by studding the surface of the piles with large-headed iron nails (scupper-nails), the oxidation of which in the sea-water rapidly impregnates the surface to a degree distasteful to the creatures. In the case of wrecks it is, however, observable that their borings closely approach iron bolts, so that ferruginous wood is not always shunned. At Devonport Dockyard the most approved method of warding off the attacks of *Limnoria* is to use good Memel timber (fir) thoroughly impregnated with creosote, this absorbent wood taking in about ten pounds to the square foot. The wood is well dried and warmed before being treated.

This habit of penetrating wood is unquestionably a very ancient one with *Limnoria*, but within comparatively recent years another taste has developed itself, viz. that of perforating the protecting envelopes and gutta-percha in which submarine telegraph-cables are sheathed. This habit is no less disastrous than the former, for by exposing the wires their insulation is interfered with, and the cable has to be raised for repairs. Considerable doubt seems to exist in regard to the form which is thus so troublesome to telegraphic engineers; indeed, it is a prevalent impression that annelids cause the mischief. Thus, amongst others, the late Dr. Carpenter forwarded *Nereis pelagica*, a common annelid, which like *Nereilepas* has the habit of dwelling in holes made by various borers, as the depredator in the case of a Spanish cable. Dr. Gwyn Jeffreys and Sir John Murray sent examples of others, including the French Atlantic cable from a depth of thirteen hundred fathoms. In all these *Limnoria* or *Xylophaga* appeared to be the cause of the faults, the repair of which is often a costly undertaking. Thus Mr. Andrews,* who found *Limnoria* in the gutta-percha coating of the submarine cable between Holyhead and Ireland, observes that a loss to the company of no less than £10,000 was eventually caused by this diminutive yet destructive crustacean. It would appear, therefore, that the views of Dr. Wallich,† who thought that "if any material exists, the characters of which are so thoroughly dissimilar from those of any substance known to occur at the bottom of the sea as to render it highly improbable that such

* Quart. Journ. Micros. Sc. (ii.), 15, p. 332.

† Ann. Nat. Hist. 3rd ser. (8), p. 58, 1861.

creatures as live there could improvise means to pierce it, whilst at the same time it would secure perfect insulation of the telegraph-wire, *caoutchouc is that material*," have not been verified.

The work of the burrowing crustaceans, however, is quite overshadowed by the far more serious encroachments which the boring shell-fishes are capable of making in timber and similar substances, as well as in rocks of diverse kinds.

Many are probably familiar with the perforations of the various species of *Pholas* on rocky shores, for they bore in sandstone, gneiss, mica-schist, limestone, chalk, lava, aluminous shale, peat, wood, and even wax. All round the western and Castle rocks at St. Andrews, as well as at many parts of the eastern rocks, the shale, limestone, and sandstone are extensively perforated by *Pholas crispata*, and less frequently by *P. candida*, while the calcareous rocks and chalk of the southern shores of England abound with another species, viz. *P. dactylus*. All these are occasionally used as food, like their southern congener of the coasts of Italy, viz. the date-shell (*Lithodomus*). *Pholas candida* seems to bore at St. Andrews in rocks somewhat beyond low water, for it was only when the blasting operations of 1896 connected with the drainage works took place that fine examples of this species were thrown in numbers on the beach, and collected by Dr. Mactier.* *Gastrochæna*, again, mostly frequents the shells of other mollusks such as *Pecten* on the southern coasts, and lines its tube with a shelly secretion. It likewise bores in granite and limestone, yet its external horny layer presents slight evidences of friction—indeed, only at one end.

The effect of the ceaseless boring of rocks all round the shores of Britain by *Pholades*, *Saxicava*, and other forms must be noteworthy, since at and beyond low water the sea, especially in storms, will break up the much perforated ledges of rock, liberating the adult as well as the smaller *Pholades* as food for other marine animals, but not before an abundant series of larvæ carry the operations to fresh sites, which range from half-tide mark to the laminarian region, and probably beyond. No effort

* This rare mechanical cause is analogous to the action of certain remarkable storms which once in fifty years may send such species as *Thracia convexa* on the beach at St. Andrews, where it was also collected by Dr. Mactier.

of man can modify to any extent these natural conditions, especially in connection with their inroads. On the other hand, the deposits going on in the bed of the sea, the drifting of ordinary and coral sand, and the increase of the deltas of rivers are examples of agencies which tend to counterbalance the effects of such erosion.

A closely allied species, *Xylophaga dorsalis*, which occurs abundantly in the deep water off the Forth (*e. g.* east of the Island of May, and off St. Abb's Head), as well as elsewhere both in England and Scotland, confines its boring action entirely to wood. This little bivalve mollusk has two helmet-shaped convex valves crossed by very fine striæ. Two small dorsal shields or plates are likewise present. It shows certain intermediate characters between the stone-borers just mentioned (*Pholades*) and the typical wood-borers (*Teredines*), having the short siphons of the former, the habit of perforating wood only to the extent necessary for its safety, and in having no calcareous lining to its tunnel; while in the structure of its valves it mainly leans towards *Teredo*. The late Dr. Gwyn Jeffreys, the able and experienced author of 'British Mollusca,' is doubtful whether the soft parts of the animal can be contained in the shell, but in all the living examples both from the eastern shores and those from the Outer Hebrides, such can readily be retracted within the outline of the valves.

In wood attacked by *Xylophaga* there is very little externally to attract attention, except the presence on the surface of minute apertures, which probably indicate the points by which the young animals obtained entrance. On breaking the wood the adults are found in smooth tunnels in every fragment large enough to afford a lodgment. Thus even a willow-basket will be invaded by them, especially the ribs, which are somewhat thicker than the other parts. The burrows are quite smooth, and generally contain greyish pulpy *débris* of minute grains of wood, which have passed through the alimentary canal and been ejected by the excurrent siphon. Most of the perforations are against the grain of the wood.

The effects of *Xylophaga* in connection with the destruction of wood in British waters are considerable, especially in the case of submerged branches, but they fall far short, both in British

and foreign seas, of those of the widely distributed genus *Teredo*. As a rule, every piece of wood from the wrecks of ships and boats on the eastern coast, and which has lain for some time on the bottom, is riddled by *Teredo*, and occasionally by *Xylophaga*. Their development seems to be such as to spread them rapidly and widely over large areas. The minute larval forms (in *Teredo*) are found in the branchial cavities in June, and in the middle of July the young, though very small, are fully formed. In September they penetrate the wood. It is further stated that these minute forms often fix themselves to a piece of wood so thin that development can only take place up to a certain size, when all must perish. This is thought by some to be a provision for keeping their increase in check, but such is probably inappreciable.

In regard to the hard parts, the globular valves agree with those in *Xylophaga*, being helmet-shaped and sculptured in a remarkable manner, so as to present a file-like surface, the function of which, not a few observers consider, is to aid in perforating the wood. There are no shelly plates or shields such as occur in *Xylophaga*, but attached to the muscular ring at the base of the siphons are a pair of pallets, which are useful to zoologists in discriminating the species, and to the animal for protection. Thus when alarmed it withdraws its long siphons within the shelly tube, and guards the aperture by folding the calcareous pallets over the tip, just as the annelid, *Lagis koreni*, does with its broad golden bristles. *Teredo* more readily accomplishes this by the presence of ledges projecting from the narrow or outer end of the shelly tube, which is a secretion of the mantle.

The food of the *Teredo* consists of Diatoms, Infusoria, and other minute pelagic plants and animals which abound in all climes in the sea. It is only necessary to drag a tow-net a little distance below the surface of any of our bays (either in summer or winter) to find an abundance of minute forms—amply sufficient to nourish these and other marine animals. The shipworm thus has no need to depend for subsistence on the minute particles of wood which it swallows, though, like the Swedish peasants with their Bergmehl, or the eaters of clay in North America, such doubtless increases the bulk of the food.

In the tube of the *Teredo*, and also in the tubes of *Pholas*, as the learned Jesuit, Bonanni, discovered so far back as 1684, an annelid (*Nereilepas fucata*) often occurs, and some observers mention that it performs the part of keeping the mollusks in check—in short, that it is a destroyer of *Teredo*. So far as known there is no foundation for this view. It is found that the same species of annelid frequents, along with the common Hermit-Crab, the shells of the Great Whelk, not for any predatory reason but simply as a commensal. The association of annelids with other forms in tubes or elsewhere is extremely common; indeed, many are found only in this association, but it is not for the purpose of preying on their neighbours, though the bodies of their hosts in many cases are softer than those of *Teredo*, and their own jaws not less formidable than those of *Nereilepas*. They are commensalistic forms or messmates—that is, dwell in association with other animals, each, as the late Prof. Van Beneden, of Louvain, tersely said, requiring from his neighbour a simple place on board his vessel without asking to partake of his provisions. Besides, Nereids have a habit of lurking in holes of any kind, and even perforating peat for shelter; and it would be unsafe to condemn them from an examination of their jaws, since some of those best armed live only on seaweeds.

But—to return from this digression—it is found that no fewer than four British species of *Teredo* and several others are occasionally found in driftwood. In the great and especially the warmer oceans almost every piece of timber is attacked, so that strict precautions are necessary to protect wooden ships, boats, and piles from their ravages.

The object in life of all the species of *Teredo* is to bore ceaselessly into timber, which they tunnel for the protection of their long worm-like bodies, and they line the interior of their tubes with a calcareous coat, which helps in some cases to separate them from their neighbours. The perforations are generally in the line of the grain of the wood, and vary in length according to the size of the specimen and the particular species. Thus the common *Teredo* (*T. navalis*) has a tunnel from one to two feet in length, while that of the giant Shipworm (*T. arenaria*) extends fully a yard, and is two inches in diameter. A curious species (*T. corniformis*), which burrows in the husks of floating cocoa-nuts

and other woody fruits in tropical seas, has extremely contorted tubes, from the limited area at its disposal.

In connection with distribution it was formerly supposed that *Teredo* did not bore under twenty fathoms, but it is quite a common thing to dredge pieces of water-logged wood from much greater depths with the living mollusks in the perforations, as in the deeps off St. Abb's Head and beyond the Island of May. Certain foreign species, again, live both in fresh water and in brackish, one, for instance, burrowing in the roots of the mangrove trees in the rivers on the West Coast of Africa, into which the sea-water penetrates only at intervals.

As might have been expected from their marked effects on submerged wood, these boring mollusks were well known to the ancients. As Forbes and Hanley and others state, they (*Teredines*) are mentioned for the first time in the "Knights" of Aristophanes. Theophrastus, the favourite pupil of Aristotle, also probably alludes to *Teredo* when he speaks of "worms which corrupt wood in the sea." Pliny the elder designates the same form as the large-headed *Teredo* "which gnaws with teeth and lives only in the sea"; and similar easily recognisable allusions are made by Ovid and other authors. The ravages made by *Teredo* on the piles composing the dykes for resisting the inroads of the sea in Holland, however, prominently brought it before the natives of that country, and three investigators took it in hand between 1720 and 1733, viz. Massuet, Rousset, and Sellius. On the present occasion it is unnecessary to enter into an account of the labours of each of these, but an excellent *résumé* is given in the 'British Mollusca' by the accomplished authors, Prof. Edward Forbes and Sylvanus Hanley. One paragraph only need be quoted. It is:—"Massuet was a Belgian, and had been a Benedictine monk, but became a Protestant and took refuge in Holland, where he studied medicine under Boerhaave. He was fortunate; for, dividing his time between his patients and his researches, he saved enough to buy a seigneurie and die rich. He wrote on history and natural philosophy. Rousset began life as a soldier, and quitted the sword for the birch. He would not have meddled with the *Teredo*, but that it took part itself in the political prospects of Europe. Sellius was a native of Dantzic, very learned but very unfortunate. He wrote a work of

three hundred and sixty pages on *Teredo*, citing within it nearly two hundred authors, and bringing all the learning of the ancients and the moderns to bear on the subject." This Dutch naturalist correctly recorded that the animal was a shell-fish, a fact which Linnæus overlooked, since he placed *Teredo* in his heterogeneous group "Vermes"—a division comprising many widely divergent forms. An interesting account of the subsequent literature of the subject is given by Forbes and Hanley, and more recently by Gwyn Jeffreys, in their respective works.

In boring the timber it is a fact of interest that the animals avoid the tubes of each other, though perhaps it may not be considered, as Sellius did, that they are actuated by a conscientious anxiety to avoid injury to their fellows. Sellius, indeed, was of opinion that *Teredo* closed in its shelly tube and died of starvation rather than penetrate into the tunnel of its neighbour.

Stokoe* more recently made the observation that in certain fossils, consisting of the harder parts of the skeleton and teeth, the boring mollusks did not affect the enamel or enamel-like dentinal layer, a fact which shows that they discriminate between such and the parts more easily penetrated. In respect of avoiding the tunnels of its neighbours, *Teredo* offers a contrast to *Limnoria*, for in the stakes of the nets for Salmon on the West Sands, at St. Andrews, the tunnels of the latter sometimes meet, and thus the young, ten or twelve of which occasionally accompany the parents at the end of the burrow, may more readily spread throughout the wood.

The destruction caused by the animals in the harbours of our own country is considerable, since it has been computed that at Plymouth and Devonport alone many thousands of pounds' worth of wood are annually destroyed. The French and Dutch, however, suffer much more seriously, the former in regard to harbours, the latter in regard to piles. Special commissions in both countries have, indeed, been appointed to investigate the subject, and various reports have been issued, to some of which allusion will by-and-by be made.

The opinion of the older authors that the valves of the *Teredo* were the teeth by means of which it gratified its appetite

* 'Nature,' vol. xx. p. 428, 1879.

—by devouring all the wood it eroded—could not long satisfy more philosophic inquirers, and accordingly many able memoirs on the boring of these and other marine animals have enriched zoological literature during the last century. In briefly alluding to these the perforations in various hard substances will be included, in order to illustrate the several features of the action.

It will be found that the theories which have been brought forward to explain the mode by which marine animals perforate materials so different as wood, limestone, resin, wax, granite, sandstone, and aluminous shale, range themselves round two great centres—the *chemical* and the *mechanical*, for it is unnecessary to dwell on such as those of a few, who fancied that *Pholas*, for instance, only bored in soft clay, and that its presence in stone was due to the petrification of the soft materials around it. This explanation is comparable to that of the religious authority mentioned by Hugh Miller, who accounted for the beautiful fossil fishes in the rocks by courageously asserting that “they were formed of stone from the very first.”

The advocates for the *chemical* theory seem to take it for granted that the borings occur chiefly in calcareous substances, and with propriety, therefore, they make their solvent an acid. It is clear, however, that this notion is unable to explain the perforations in media totally impervious to such action. Moreover, no trace of acid is found in many borers, and though present in some it is likewise characteristic of other marine animals which do not bore. Further, it is purely hypothetical at present to bring in the aid of carbon-dioxide derived from sea-water for the same reason.

The *mechanical* theory, again, supposes that the animals perforate by means of shells, gritty particles, or odontophores in the case of mollusks, teeth in the sea-urchins, bristles in the annelids, horny processes in certain sea-acorns (Cirripedes) and Gephyreans; but doubt remains concerning the extensive and wonderful excavations of the sponges, those of the Bryozoa, the *Helices*, and the rest of the Cirripedes. If, however, the theory of “maceration” is regarded as a modification of the foregoing, certain objections will disappear. The grains of wood found in the stomach of *Xylophaga* and *Teredo* are, however, interesting in this connection.

In regard to the borings of mollusks, many authors—such as Bonanni, Adanson, Born, J. E. Gray, Fleming, Osler, Forbes and Hanley, Cailliaud and Robertson—have believed that such are made by rotations of the valves after the manner of augers. Little, however, is said about the smooth valves of such as *Saxicava*, *Gastrochæna*, and *Lithodomus* in contrast with the rough valves of *Pholas* and *Teredo*.

This theory, however, is not supported by an examination of the perforations of the Algæ, Sponges, Bryozoa, those of the Annelids, Gephyreans, Cirripedes, and *Helix*, nor by a comparison of the shells and tunnels of the animals themselves. The texture of the valves of the date-shells, for instance, is so soft that they could not act materially on the hard stones into which they bore. Moreover, it has to be remembered that the surface of such shells is covered by the periostracum, which would materially suffer before much effect could be produced on the rocks.

Hancock, again, propounded the theory that the holes were made by silicious particles in the foot of the mollusk (which particles could not, however, be found by that most accurate and conscientious observer, the late Prof. Busk), while Bryson gave the chief action to grains of sand from the exterior. Fisher thought that they were effected by the foot in some way. None of these views would explain the perforations in limestone by the “*Hélices saxicaves*” of Bouchard-Chantereaux.* Other authors asserted that the annelids bored by aid of their bristles, just as Darwin had predicated of the Gephyreans and their chitin.

A more gentle method of tunnelling was that advocated by Garner, who held that the excavations were due to ciliary currents aided by rasping. The currents may assist, but seem to be insufficient to account for the borings in any group.

The next theory is one that has been frequently applied to the action of marine animals on their surroundings, *viz.* that the perforations are due to a chemical solvent. Amongst others who have chosen this explanation may be mentioned Gray, Osler (for *Saxicava*), Drummond, Cailliaud, Mantell, Thorrent,

* Ann. des Sc. Nat. 4e sér. xvi. pp. 197–218, pl. 4. These figures exactly correspond with a fine mass of limestone perforated by *Helix* sent by Dr. Scharff from Ireland.

Reeve, Bouchard-Chantereaux, Spence Bate, Darwin (for *Verruca*), Ray Lankester, Parfitt and Schiemenz (for *Natica*). The latter has shown that the main agent in the small holes made in mussels and other shells by *Natica josephina* at Naples is the boring-sucker on the under surface of the proboscis.* Carazzi also describes the perforations of the date-shell (*Lithodomus dactylus*) as being due to chemical action, since its perforations are keyhole-shaped. It differs thus, he says, from *Pholas*.

But this view will not explain the extensive perforations in wood (now specially before us), in aluminous shale, gneiss, granite, sandstone, gutta-percha, resin, and wax. It is interesting, however, that shells and calcareous rocks are much affected by burrowing marine animals. Moreover, it is well known that even gentle friction on a wet calcareous surface—as by the feet and tails of Wallabys and allied forms at a drinking-place—will make a beautifully polished “face” like that on the finest marble.

Thompson and Necker, again, were of opinion that the boring action was a compound one—the result of a secreted solvent, aided by rasping; hence the solvent would require to vary with the nature of the rock attacked.

Lastly, the very old idea of Sellius (and Deshayes), adopted by Gwyn Jeffreys, has to be considered, *viz.* that the perforations are caused by a macerating or simple solvent action of the foot, and De Quatrefages thinks also of the mantle.† This would certainly avoid many of the difficulties caused by the previous theories, but it is doubtful if much support for this opinion would be derived from the action in Sponges, Bryozoa, Annelids, Gephyreans, and Cirripedes. It has also to be borne in mind that the crustaceans which burrow in wood do so only by mechanical means, and so with certain burrowing insects.

Leaving the subject of the means, which would appear to be

* Mitt. Zool. Stat. Neapel, Bd. x. p. 152, Taf. 11.

† This recalls the statement that if a plant be permitted to grow on polished marble an outline of the root is marked on it, a result supposed to be due to an acid secretion (chlorhydric) of the root-hairs. Prof. J. H. Storer, indeed, endows the rootlets with what he terms a power of osmotic dissociation, and he would extend the same explanation to the boring animals (Amer. Jour. Sc. 28, pp. 58–61, 1884).

varied, by which marine animals bore for the present, a glance may now be taken at the methods of protecting timber from their ravages. Very many suggestions and experiments have been made with this view. Even so early as the days of Sellius several hundred preparations were known, most of which, however, were useless. At the present time the means for defending submerged timber from a scourge so serious group themselves under two heads, *viz.* (1) in regard to the kind of wood employed, and (2) the treatment of the wood before immersion.

In the first category, it is stated that *Teredo* will not touch the Pyengadu or Ironwood Tree, a species of *Acacia* from the Burmese forests. It contains a thick gelatinous oily substance. The same is said of Huon or Macquarie Harbour Pine, Tasmania, and the Kaurie or Cowdie Pine (*Dammara australis*) from New Zealand. The Jarrah Tree (*Eucalyptus marginatus*) defies *Teredo* and the white ants, so that copper-sheathing is unnecessary, a state probably due to its odour or taste, as no specially distasteful chemical substance, acid or otherwise, has been found. The Heartwood Tree (*Nectandra Rhodiæi*) of Guiana, which furnishes *Beberia*, is considered by some to be proof against *Teredo*, though this is doubtful. It pertains to the natural order *Lauraceæ*, which comprehends sweet-bay, camphor, sassafras, and other well-known forms. Other woods, such as sneeze-wood from the Cape; teak, hemlock-tree with its bark, Cay-don from Cochin China; and various hard and close-grained woods have been recommended, though, so far as known, with comparatively little success on a large scale.

Under the second head fall all the chemical and other substances which have been applied to the exterior of the wood, or forced into its tissue under great pressure. Many preparations of tar and varnish would suffice to keep out the young *Teredo*, if such would remain intact, but unfortunately friction soon interferes with their continuity, and then a lodgment is effected. Soluble bitumen (composed in all probability of pitch and wax), silicate of lime, and various patent compositions have each in turn been tried externally; while the silicate of lime, creosote, and other fluids have been driven under great pressure into the tissue of the wood.

The Dutch Commissioners experimented with metallic sub-

stances—Russian talc, paraffin varnish, oil of tar, various kinds of paint, and by carbonising (by burning) the surface of the wood ; but none of these methods met with their confidence.

Impregnation of the wood was next tried with sulphate of copper, sulphate of iron, acetate of lead, calcium chloride, oil of tar, and creosote. The latter alone, and only when thoroughly carried out, was found to be useful ; and at the present moment this, sheathing in copper, and the studding of the timber with broad-headed nails (scupper-nails) are the only reliable methods adopted in the Netherlands. And yet creosoted timber is not always safe, for Dr. Gwyn Jeffreys found it attacked in Sweden. Somewhat recently an American has recommended that a cylindrical excavation round the core of logs of wood should be filled with a special cement, impenetrable to *Teredo*. It would be difficult, however, to adopt this on a large scale.

While the Dutch, French, and other Commissions have thus done material service in regard to the best means for protecting timber from the attacks of various borers, the subject is by no means exhausted. On the contrary, it would form a fitting one for modern research at the Marine Laboratories.

In the foregoing remarks only a brief *résumé* has been given of the kinds of marine animals which by the extent of their perforations materially affect submerged timber and other solid substances. In conclusion, however, it is well to draw attention especially to the fact that this ceaseless boring in wood is not an unmitigated evil, even though Mr. Brunel had not received a hint from *Teredo* in forming the Thames Tunnel. The masses of timber swept seawards by many foreign rivers would prove a serious impediment to navigation if the marine borers did not slowly but surely accomplish their dissolution. In the same way floating timber and the relics of many a ship and boat in the depths of the sea are disposed of. Fortunately the extensive use of iron and steel in shipbuilding now renders the ravages of the borers in wood less prominent. Moreover, vast numbers of shells are broken down by boring sponges, annelids, boring algæ,* and other forms, and ultimately are either altogether dissolved or deposited as shell-gravel. Further, this increase of animal life—both larval and pelagic, and adult and sedentary—is every-

* Bull. Amer. Mus. Nat. Hist. xxv. pp. 323-332, 1902.

where utilized directly or indirectly for the food of fishes at various stages of growth, the minute young capturing the larvæ, and the older forms feeding, for instance, on the boring shell-fishes scattered by the breaking up of the honeycombed slabs on the floor of the ocean. Thus the ultimate result of all these processes would not appear to be wholly disadvantageous to man.

In connection with the perforations of marine animals in hard materials, it is to be hoped that fresh and careful observations will by-and-by be undertaken in every group available on our shores, not primarily for the sake of avoiding the comparatively slight erosions thus caused on the coastal rocks, or of interfering, even were that possible, with the beneficial action on submerged driftwood and wrecks, but for the purpose of increasing knowledge. Quite recently the country has embarked on an outlay which will not fall far short of £100,000 for marine investigations which, if for the moment the pleasant international *camaraderie* is put aside, experience knew from the inception were on the main point futile, or, at best, could only substantiate what already had been proved. It might be well if the Government considered, in this light, whether in the past it has done its duty to scientific marine investigations at Marine Laboratories.

NOTES ON THE ARCTIC WHALING VOYAGE OF 1907.

BY THOMAS SOUTHWELL, F.Z.S.

BAD as the voyage of 1906 proved to be, when only seven Whales were killed, that of 1907 was far more disastrous, the chief causes of which were severe weather and unfavourable ice conditions. I am informed that in Davis Strait on many occasions Whales were seen, sometimes quite near the vessels, but it was impossible to lower the boats for their capture. The result is that in all only three Whales were captured, one of which, little better than a sucker, was procured in Davis Strait, the other two at the Greenland fishery.

It is curious that during the past two seasons the greatest success (small, indeed) has been obtained in the Greenland Seas, where these Whales were believed to be practically extinct, so much so that no vessels were despatched there for several years, whereas in the Davis Straits only three Whales have been killed in the past two seasons against six in Greenland; but in both regions more Whales were seen than captured, particularly in Davis Strait, where they are reported, especially late in the season, to have been very restless, and always on the move, a fact which the captains found it difficult to understand; so far as could be seen no Grampuses, their greatest enemies next to man, were about to produce the disturbance. The weather is said to have been atrocious in the Straits during the whole season, and other conditions, the worst ever remembered.

Seven vessels left Dundee, as last year—the ‘Active’ for Hudson Strait, whence she returned with a rather miscellaneous cargo collected at the winter station there, consisting of 32 White Whales, 374 Walruses, 185 Seals, 65 Bears, 650 Fox-skins, and 22 tuns of oil, but no Whales.

The ‘Scotia’ first visited Greenland, where she captured

two Whales of eleven feet and nine feet bone respectively, yielding 32 cwt. of bone; a third Whale broke away with nineteen lines and was lost. Others were seen but not captured. The season was very unfavourable for the northern fishery, but the southern—apart from fogs—was very fair. From Greenland the 'Scotia' proceeded to Davis Strait, but there had no success.

The other five vessels—the 'Diana,' 'Balæna,' 'Eclipse,' 'Morning Star,' and 'Windward' went to Davis Strait direct, where the only Whale captured was the sucker already mentioned, killed by the 'Diana,' which yielded only half a hundred-weight of bone—a poor return for seven months' toil. The other vessels were still more unfortunate. When opportunities did occur their attempts were always attended with disappointment—fog coming down or harpoons drawing. Indeed, the voyage is described as one continuous battle against storm, ice, and fog.

We have yet to speak of the 'Windward.' On June 25th this vessel struck upon a submerged rock near the Carey Islands, and became a total wreck. Her crew took to the boats, and after terrible exposure and great hardships they were eventually rescued by the 'Morning Star' on July 6th. Death also added to the misfortunes of the fleet. On June 14th the engineer of the 'Windward' died, and on August 16th one of her rescued crew died on board the 'Eclipse,' which latter vessel also lost one of her hands by death.

The ships' logs, from the beginning of the voyage to its end, are said to be a continuous record of battling with wind, sea, and ice, varied with spells of what sailors dread more than these—Arctic fog; added to which the want of success which attended their efforts to capture Whales when seen, the deaths of their companions, and loss of one of the fleet render the voyage of 1907 one of the most disheartening on record.

In addition to the seven vessels named the ketches 'Snowdrop' and 'Albert' brought home produce collected at the Frobisher Strait and Pond's Bay stations, the latter reporting that they had only seen one Whale during the whole season.

The total result of the season's fishing, including the produce brought home by the 'Snowdrop' and 'Albert,' was three

Whales, 36 White Whales, 634 Walruses, 1021 Seals, 258 Bears, 740 Fox-skins, 97 tuns of oil, and $32\frac{1}{2}$ cwt. of bone. A large proportion of this miscellaneous collection was obtained at the winter stations. The price of whalebone, the quantity of which in hand from the North Atlantic is, I believe, very small, is about £2400 per ton, and that of oil £22 10s. per tun. The total value of the whole produce is roughly estimated only at about £13,000.

What will be the result of the series of disastrous years, entailing so serious a loss upon the "adventurers," it is difficult to say. Perhaps there is no industry which offers such prizes to the successful, but the climatic conditions on which to so large an extent success depends are so uncertain that the enterprising Dundee merchants may still be tempted to court fortune in the frozen North.

I am, as usual, much indebted to Mr. Robert Kinnes, of Dundee, and for statistics to Mr. Mitchell's 'Circular.'

BIRDS OF THE GRAAKALLEN MOUNTAIN, NORWAY.

BY REV. WILLIAM SERLE, M.B.O.U.

THE Graakallen—a mountain rising nearly 2000 feet in height—is a well-known ski-ing resort, six miles south of the town of Trondhjem, North Norway. On the top it is bare and rocky, but the slopes are covered sparsely with pines, while some little lochs lie around the base. On its slopes I lived from May 18th till June 6th, 1907, and I spent the time wholly studying its bird life. Unfortunately for my purpose the season was an abnormally late one, and whilst at the beginning of my stay birds were scarce, when I left they were becoming abundant in every spot—I only saw one Willow-Warbler at Trondhjem on May 11th; by the beginning of June they simply swarmed on the Graakallen. I seemed to think the migrant birds that gradually ascended the hill-slope did not first strike Norway by the Trondhjem Fiord, but by the mouth of the Orkla River, thence into the valley of the River Nid, and so reached the Graakallen; and I might further remark, judging from the type of coast-land between Bergen and Trondhjem, that migrants from the Scottish coasts will likely seek the Norwegian coast to the north of Trondhjem, leaving the greater part of Norway to be occupied by birds migrating north by way of Heligoland and the entrance to the Baltic. Birds were comparatively tame, and were not molested by boys. I noted a kind of nervousness about them, but then they are seldom disturbed in their breeding haunts. I give a list of the birds observed on the Graakallen, omitting the Gulls, which flew across country from the harbour at Trondhjem to the mouth of the Orkla.

MISTLE-THRUSH (*Turdus viscivorus*).—I came upon a pair on the east slope of the hill, pretty low down, which seemed to have a nest, judging from their anxious behaviour.

SONG-THRUSH (*T. musicus*).—Distributed all over. Strange however, were it not for their song it was easier finding their

nest than getting a sight of the birds. Here they are very quiet and retiring in their habits and seldom seen; they began singing about 10 p.m., and sang more or less all night, but their song had not the compass or quality of home birds.

REDWING (*T. iliacus*).—This bird, not over-abundant when I arrived, became very common later. I saw them first on May 17th, crouching on the sides of the road whilst showers of snow were drifting past. It is rather difficult wading among the deep snows amid the pines, yet I found a good few nests, and could easily have found more had I been anxious. Their trilling song is very pleasing and very characteristic of these lonely parts, and gives a good indication of the number of pairs that may be breeding around. Their nests were fairly well hidden, built low down, and one I found built against a boulder. I took the first full clutch on May 22nd, and I saw young ones well grown on June 3rd; yet in the valley leading down to Loch Shalbrea I found no nests on June 5th, although the Redwings were numerous, and by their behaviour they indicated they were later in breeding in that valley.

FIELDFARE (*T. pilaris*).—A most abundant bird, breeding in colonies; later I noted birds nesting separately further up the hillside. I took a clutch on May 18th. Here the colony at the time was small, but it became a large one before I left. Field-fares are very noisy at their nests, and do their very best to tell you where they are. They build higher on the tree than Redwings.

RING-OUZEL (*T. torquatus*).—There were scattered pairs all round. They had not commenced breeding when I left, but then a lot of snow fell during the last five days of May, and the Ring-Ouzels frequented exposed parts.

WHEATEAR (*Saxicola ænanthe*).—A common bird. It had commenced to breed before I left.

WHINCHAT (*Fringilla rubetra*).—A common bird in suitable spots. A persistent singer. These birds had not started nesting at the beginning of June.

REDSTART (*Ruticilla phœnicurus*).—Common. They commenced breeding in June.

GOLDEN-CRESTED WREN (*Regulus cristatus*).—It was easier to

hear their squeaking notes in the pine-woods than to see the birds. They were not common.

WILLOW-WARBLER (*Phylloscopus trochilus*).—By the first days of June they simply swarmed everywhere, but had not commenced breeding. I seemed to think their notes louder than at home.

HEDGE-SPARROW (*Accentor modularis*).—A lonely retiring bird here, but common; its numbers increased as time went on. A heavy snowstorm late in May covered a nest containing five eggs. I thought the bird would have deserted the nest, yet in a day or two she returned and began to incubate.

GREAT TIT (*Parus major*).—Though common low down, I only heard their notes on the hillside when June had come.

NORTHERN MARSH TIT (*P. palustris borealis*).—Common everywhere. It was a pleasure listening to their notes. They are very light in colour.

WREN (*Troglodytes parvulus*).—I saw it, but it is evidently scarce.

WHITE WAGTAIL (*Motacilla alba*).—Common when I arrived, scarcer later when they scattered to breed.

TREE-PIBIT (*Anthus trivialis*).—One took up its quarters in a bit of marsh near a stable.

MEADOW-PIBIT (*A. pratensis*).—A few pairs were to be found about the mountain.

SISKIN (*Chrysomitris spinus*).—This pretty bird was in fair numbers. I noted one carrying nesting material.

GREENFINCH (*Ligurinus chloris*).—I noted but one, feeding on a juniper bush.

HOUSE-SPARROW (*Passer domesticus*).—The first Sparrow—a female—appeared where I stayed on May 30th. They bred later.

CHAFFINCH (*Fringilla cœlebs*).—Everywhere common.

BRAMBLING (*F. montifringilla*).—A common bird. They were only commencing to build when I was leaving.

LINNET (*Linota cannabina*).—I noted a few.

NORTHERN BULLFINCH (*Pyrrhula europæa major*).—Two pairs of this large form of Bullfinch were always to be found at two certain spots.

YELLOWHAMMER (*Emberiza citrinella*).—Fairly common, and not objecting to the pine-woods.

STARLING (*Sturnus vulgaris*).—The first one appeared where I was staying on June 3rd. The proprietor was delighted to have them back for the season. He told me that a pair had remained for the first time during the last winter at a neighbouring farm place in the Nid River valley.

MAGPIE (*Pica rustica*).—A common breeding bird.

HOODED CROW (*Corvus cornix*).—Common; and suspiciously watched when he looks near a Fieldfare colony.

CUCKOO (*Cuculus canorus*).—First heard on June 1st from the top of the Graakallen. Two were calling to one another from a high snow-covered moor to the south—odd-looking surroundings, I thought, for the bird.

BUZZARD (*Buteo vulgaris*).—A large Hawk, I am pretty sure, of this species I saw flying across Loch Shelbrea carrying something to a thick clump of pine on the side of the mountain.

MALLARD (*Anas boscas*).—A pair frequented a little sheet of water.

PTARMIGAN (*Lagopus mutus*).—An abundant bird all over the mountain.

CAPERCAILLIE (*Tetrao urogallus*).—I saw a few of these birds among the pines. People spoke of these and of Black Grouse as common.

WOODCOCK (*Scolopax rusticola*).—A few seen regularly at nightfall flying down to a marshy tract of land to feed.

SANDPIPER (*Totanus hypoleucus*).—A common bird on the small rivulets flowing down to the lakes.

CURLEW (*Numenius arquata*).—A few scattered all round.

ON THE EVOLUTION OF *DINARDA*, A GENUS OF COLEOPTERA.

BY ERICH WASMANN, S.J.*

(Translated by Horace Donisthorpe.)

As an instance of recent species building, I brought forward, in 1901,† the genus *Dinarda*, in the Brachyelytra (*Staphylinidæ*). It can be shown that our North and Central European two-coloured (red and black) forms of *Dinarda*, which are adapted to different species or races of the genus *Formica*, stand in different stages of species building. Two of these—*Dinarda dentata* (with *F. sanguinea*) and *D. märkeli* (with *F. rufa*)—have already become throughout their area of distribution such constant forms that they have been hitherto not incorrectly treated as species. Two other nearly related forms, on the other hand—*D. hagensi* (with *F. exsecta*) and *D. pygmæa* (with *F. rufibarbis*, and especially with the var. *fusco-rufibarbis*)—are still considered to be in the process of adaptation to their ant-hosts; in some parts of the area of distribution of the latter they have already become well-defined forms; in other regions they still show numerous transitions towards *D. dentata*; finally, in others, no adaptation of *Dinarda* to *F. exsecta* and *rufibarbis* has yet taken place. We have also before us in these two forms of *Dinarda*, which gradually approach in the path of variety and race-building, every stage of species building which has already been reached by *Dinarda dentata* and *märkeli*. My previous observations have strengthened these ideas in essentials, and at the same time have also afforded some further points of confirmation relative to external factors, which imply these processes of differentiation with regard to adaptation.‡

* Sonderabdruck aus der Festschrift für J. Rosenthal., Leipzig, 1906.

† “Gibt es tatsächlich Arten, die heute noch in der Stammesentwicklung begriffen sind?” (Biol. Centralbl. xxi. nr. 22, u. 23).

‡ See my book also on this, ‘Die moderne Biologie und die Entwicklungstheorie’ (Freiburg, i. B. 1904), pp. 214–215.

The sooner the adaptation of *Dinarda* to *F. exsecta* and *rufibarbis* has taken place in a region, the more they are protected, through local isolation of the ants' nests in question from those of allied species of *Formica* (especially of *F. sanguinea*), so much the further has also the differentiation of the forms of *Dinarda* in question progressed.

This is most clearly shown, as yet, in the differentiation of *D. pygmæa* from its ancestral form *dentata*.

Also as regards *D. hagensi*, some new facts have been added in the last few years, which show that its adaptation to *F. exsecta* is not yet completed, but that in different points of its area of distribution it stands at different stages in the process of species building. Donisthorpe* found a number of *Dinarda* with *F. exsecta* at Bournemouth (county of Dorset, South England), which comes nearer to the typical examples taken by Von Hagens in the Siebengebirge in 1855 than the *Dinardas* taken by me at Linz on the Rhine with the same ant in 1893-1901. Most of these English examples show, just as Von Hagens's type, no raised keeled border to the elytra, but these organs are regularly arched, in which these examples even depart from the generic diagnosis of *Dinarda* ("elytrorum margine laterali carinato"). Also, the antennæ are shorter and more compact than in *D. dentata*. On the other hand, the border of the elytra in the examples from Linz is distinctly raised and keeled, and the antennæ are somewhat more slender than in *dentata*. In some of Donisthorpe's examples from England transitions between both the *hagensi* forms are noticeable in that the border of the elytra is sometimes feebly raised, and the antennæ are less compact. *Dinarda hagensi* has evolved, at different points of its area of distribution, as far as different stages towards a peculiar form; further, according to the specimens found up to the present, it has made the greatest progress in the Siebengebirge, in the Rhine Provinces, and in South England, which during "diluvial" times remained free from ice, and represents the oldest district for the adaptation of this *Dinarda* to *F. exsecta*. Should the process of differentiation which separates *D. hagensi*

* "*Dinarda hagensi*, Wasm., a species of Myrmecophilous Coleoptera new to Britain" (Entom. Record, 1905, pp. 181-182). Donisthorpe sent me examples of these *Dinardas*.

from *dentata* make still further progress elsewhere, then *D. hagensi* could not be included any more in the generic diagnosis of *Dinarda*, since the keeled border of the elytra of the latter has hitherto been regarded as essential. We must even define the whole group of *Dinardini* differently, since that keeled border of the elytra formed its most essential character! It has been objected by some defenders of the "constancy theory" that the previous observations on *Dinarda* offer no evidence on behalf of the evolution theory, since here it is only the question of evolution "within the species." In fact, it is perhaps better to reckon, as I showed more completely in 1896,* our four two-coloured *Dinarda* forms as races, rather than as species in the strictest systematic sense. But, in any case, they offer races, which stand at different stages in their evolution; *D. dentata* and *märkeli*, as far as concerns their constancy, have arrived much nearer to "true species" than *D. hagensi* and *pygmæa*. Further, indeed, as has been shown above, the keeled border of the elytra in the typical *D. hagensi* has disappeared; but when in this evolution a character can disappear, which has hitherto been held as essential, not only for the species but even for the genus in question, even for the whole group of genera, then the objection that it is only a case of evolution within the species will fall to the ground.

Let us now consider a similar process of differentiation, such as is the case which has furthered, and is still furthering, the evolution of our two-coloured forms of *Dinarda*, through the adaptation to different species of the genus *Formica*, extended to the adaptation of allied *Dinardas* to ant-guests of different genera and subfamilies. In this case, too, we get a phylogenetic understanding for the differentiation of the genera *Dinarda* and *Chitosa*. *Dinarda nigrita*, which occurs in the Mediterranean province, which Cassey has lately raised to the new genus *Chitosa*, is in the highest degree probably sprung through the adaptation of a *Dinarda*-like ancestor to the Myrmicide *Stenamma* (*Aphænogaster*) *testaceopilum-nigrita*, which is the actual host of *Chitosa nigrita*. The same essential differentiation process that we find in the evolution of *Dinarda* also takes place here, only that it already

* "*Dinarda*-Arten order Passen" (Wien. Entom. Zeitung, xv. 4 und 5, Heft. pp. 125-142).

began at an earlier date, and has attained, owing to the great difference of the hosts, the genera *Formica* and *Stenamma*, a much greater divergence between the adaptation forms in question. The same thing can also be shown for the tropical genera *Fauvelia* and *Allodinarda*, Wasm.

As I have previously remarked, it would be certainly wrong to conclude that the evolution of new species and genera has been effected in other ant-guests and Termite guests along the same path of a quite gradual variety-and-race-evolution, as in *Dinarda*. For the guests of the protected type, to which *Dinarda* belongs in a great measure, other biological principles of adaptation are in force than for the guests of the Symphile type (=relations of friendship) and the mimicry type. Together with the fluctuating variation we must always take into consideration the possibility of the building of new forms through mutation. Without entirely excluding Natural Selection, I believe further, in the case of guests of the Symphile type, we must attribute* great weight to Friendly Selection as a factor in evolution.

* See on this 'Biologie und Entwicklungstheorie,' 2 Aufl. 9 Kap., especially pp. 219 ff., 230, 259 ff.

NOTES AND QUERIES.

AVES.

Domestication of the Jackdaw.—About the middle of June, 1907, I brought home two young Jackdaws from a neighbouring village, which were allowed their liberty about the place with uncut wings, and only shut up at night. At the time of the autumn migration their habits became rather erratic, so that sometimes we did not see them for two or three days at a time, and on November 9th we had what we thought was the last visit from one. However, on January 14th we were surprised to see him return, none the worse for the sharp frost, which must have made food difficult to obtain. He was as tame and friendly as ever, perching on the arm of his mistress and feeding from her hand, and up to the present (January 21st) he has come back every morning, going away at night. It would have surprised us less had he appeared at the return migration in March or April, and there is a record in the 'Birds of Norfolk' (vol. i. p. 279) of a Jackdaw which returned after nearly a year's absence, coming to the call of the boy who used to feed it, and settling on his shoulder. Certainly there are no bird-pets to compare with full-winged Jackdaws for tameness and sociable habits; these two birds, for example, would accompany my daughters and their dogs for long walks about the fields and meadows, and spend hours with us in the garden, where their attentions to fruit and flowers were not always of a desirable nature. But at the same time there are no pets more likely to be lost.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Bean-Geese on the Dee Marshes.—As there appears to be some doubt as to the occurrence of the Bean-Goose (*Anser segetum*) on these marshes, it may be worth recording that on January 22nd last I saw a "gaggle" of fifteen of this species near Puddington. The difference between this bird and the Pink-footed Goose (*Anser brachyrhynchus*) was very apparent with the aid of a telescope at a reasonable distance. Compared with the Pink-footed—of which there are large numbers annually on the salt-marshes—the Bean-Goose is considerably less wary, and is apparently a more silent bird both on the wing and on the ground. I walked towards them for some distance in the open before they took wing, which they did without uttering a sound.—S. G. CUMMINGS (Upton, Chester).

NOTES AND QUERIES.

American Wood Duck in Oxfordshire.—In the last number of 'The Zoologist' (p. 33) it is suggested that the specimen of *Aix sponsa* shot in Oxfordshire might possibly be a wild one. We have large flocks both of *Aix sponsa* and *Aix galericulata*, which have never been pinioned, and the former have bred here for years. Woburn is about twenty-five miles "as the crow flies" from Oxford. M. BEDFORD (Woburn Abbey, Woburn).

The Smew in Northumberland.—A male of this species (*Mergus albellus*) in fine plumage was shot in the neighbourhood of Colt Crag, North Tynedale, Northumberland, in December, 1907.—J. S. S. WALTON (Sunnyside, Stocksfield-on-Tyne).

Ornithological Records from Chester and North Wales.—1. Siskin, female (*Chrysomitris spinus*); Hoole, near Chester, Dec. 15th, 1906.—2. Fork-tailed Petrel (*Oceanodroma leucorhoa*); Ellesmereport, near Chester, Dec. 16th, 1907.—3. Common Bittern (*Botaurus stellaris*); Stoke, near Chester, Jan. 28th, 1908.—4. Red-throated Diver (*Colymbus septentrionalis*); Corwen, Nr. Wales, Jan. 7th, 1908. — ALFRED NEWSTEAD (Grosvenor Museum, Chester).

Wildfowl in Somerset.—The following notes from my own observations made lately in Somerset may be of interest:—On Jan. 9th there were plenty of Gulls (*Larus ridibundus*) inland on the flooded fields near Yatton Station. On Jan. 9th, a cold frosty morning, I noticed the following birds in Sand Bay, north of Weston-super-Mare:—Mallard and Duck, twelve; Sheld-Duck, quite five hundred, scattered in parties over the Bay (this species has certainly increased of late years in the district); Scaup-Duck, a flock of about one hundred and fifty; Pochard, one drake; Curlews, about two hundred; Redshank, three; Ringed Plover, about thirty; Dunlin, a large flock of one thousand or more. There were also many Gulls about, chiefly *L. canus* and *L. ridibundus*. On Jan. 15th Scaup and Sheld-Duck were still in the bay in large numbers, and another flock of about two hundred Scaup were feeding in Weston Bay. This species is a regular winter visitor to the Bristol Channel, the flocks including a large number of adult drakes, conspicuous, through a strong glass, owing to their grey backs and white flanks. On Jan. 15th I went to the Bristol Waterworks Company's new reservoir at Blagdon, completed about eight years ago. This fine sheet of water, which, except for the dam, looks like a natural lake, extends for a mile and three-quarters in a valley to the north of the Mendip Hills. When the lake is full the surface area is four hundred and fifty acres. In places the water is very shallow, but the maximum depth is thirty-seven feet. I

expected to find this reservoir a good resort for wildfowl, and was not disappointed. Tufted Ducks, to the number of at least two hundred, were busy diving in twos and threes, and little parties of twenty or thirty all over the water, a good proportion being adult drakes in full plumage. The birds were rather restless and often on the wing. Pochards were perhaps a little more abundant than the Tufted Ducks. Coming rather suddenly on a sheltered bay, I counted one hundred and fifty of this species resting, with other waterfowl, in a compact flock on the water. They were not very shy, merely swimming quietly out a little way into the lake, and returning to doze as soon as I had passed. Besides this flock many other Pochards were scattered over the water. A splendid adult drake Golden-eye followed by a duck kept well out in the rough water, and was continually diving. There were also a good many Mallard about, and a fair number of Wigeon and Teal, all very shy and probably lately shot at, but I could only make out two Shovelers, both fine drakes. A bird which must have been a female or immature Smew puzzled me for a long time. It was perhaps the shyest bird upon the water, and kept out of easy range of my glasses. The throat and neck showed white, and during flight there were very conspicuous white markings visible on the wings. Coots might be seen in hundreds, perhaps in thousands. They were everywhere, and mingled with the other fowl. I also noticed two Herons. A strong south-west breeze was blowing, ruffling the water considerably, but many of the Diving Ducks seemed to like the rough water. I am told on good authority that other species, such as Grebes and Divers, have been seen on the water, and that Shovelers and Tufted Ducks have been known recently to remain to breed by the lake. In winter twelve guns are said to have shot two hundred Duck, chiefly Teal, in one day. The lake, already famous for its big Trout, is evidently a very interesting bird resort, and is worthy of the attention of naturalists.—F. L. BLATHWAYT (Lincoln).

Distinct Types in Eggs.—In ‘The Zoologist’ (*ante*, p. 30) I have read with interest the article on “Eggs of the Red-backed Shrike,” which is a reply to a previous note on the same subject. My limited experience leads me to agree with Mr. Bunyard. For years I had the run of a large Black-headed Gullery (*Larus ridibundus*) in Perthshire. Year after year in the *same* part of the moss we used to look for and find the exact same type of eggs—such as spotless blue and beautifully zoned eggs. We always held these were the production of the same female. In 1903 I picked up a clutch of two almost spotless blue eggs, slightly malformed. Returning to the same spot in 1904,

I again got a clutch of two eggs of the exact same type, and also slightly malformed. Both clutches I still have, which to my mind proves them to be the product of the one bird. Speaking to one of the St. Kilda men about a specially fine Puffin's egg, he told me that this same type of egg (and only one egg) was laid each year in the same burrow. I could give many other instances, but do not wish to trespass any further on your space. — T. THORNTON MACKETH (The Hall, Caldwell, Renfrewshire).

Some Ornithological Notes from Mayo and Sligo.—This has been the first season since 1898 that *Motacilla alba* has not been observed visiting the Island of Bartragh on their spring journey to the northern breeding haunts. However, I have no doubt but that they did pay their usual visit to rest and feed, though sometimes, as they remain only a few hours, it is possible that during their short stay they escaped the notice of Captain Kirkwood and his man, who always keep a good look-out for these birds during the migration time, the end of April and beginning of May. When they visit the island they are always to be met with on and about a marshy pasture near the shore situate between the garden and the sand-hills, sometimes in the garden and a field close by, but their favourite haunt is the marshy pasture. If northerly or north-easterly winds prevail at the time of their visits their stay is prolonged for a day or two until the wind moderates. The birds generally appear in little flocks of four or five individuals, on different dates, and leave and are replaced by others. In the season of 1898 there were four separate arrivals and departures, one pair of the last party of visitors remaining until the end of May, and the late Mr. A. C. Kirkwood, expecting and hoping they would remain to nest, was much disappointed by their leaving the island as the others did. In 1906 there were four arrivals on separate dates. Captain Kirkwood observed two birds on May 1st, but they remained only a few hours. On the 5th six appeared, out of which he obtained a pair for me. This little flock disappeared next day, but was replaced by four birds on the 9th, and were joined by another bird on the 10th, when I had the pleasure of seeing and watching them for nearly an hour as they ran about and fed on the marshy flat adjoining the Rabbit-burrow. This lot also left that evening or next morning; but afterwards a few other birds were observed by Captain Kirkwood on the 12th and 13th, the last visitors for the season. No large flocks have ever been noticed, and the unusual number of fifteen has been only once observed by the late Mr. A. C. Kirkwood, on May 12th, 1898. Our

small birds—Chaffinches, Green Linnets, and Yellowhammers—as usual, disappeared this autumn. I believe they began leaving in August, for on Sept. 1st no Chaffinches were about this place, and by Oct. 1st none of these species were to be seen anywhere about the district. It was not until Nov. 12th that any of the strangers put in an appearance here, when I observed about thirty birds in one of my fields; but no doubt the large migratory flocks had arrived inland some time previously, because for some days or weeks after their arrival they keep flocked together before dispersing over the country, and replacing the home-bred birds in the usual haunts. In the last week of November I noticed that the strangers had assembled in numbers about the stubbles and stackyard here, and about eight or ten days later I remarked that all through the district the birds had settled down, Chaffinches being especially numerous. With regard to the swimming birds and waders, Curlews did not appear to be as numerous as last season, and the Lapwings far less; while Golden Plover occasionally appeared in very large numbers, quite as numerous as last season. Wigeon appeared in their usual numbers, and during the few nights' frost the first week of the New Year very large numbers assembled in the estuary. But the Wild Ducks did not leave their inland haunts; very few were down, because the frost was not severe enough to drive them from the bogs and lakes. On only two nights was the mercury down to twenty-five degrees, and unless there are at least ten degrees of frost very few Mallards come down to the estuary.—ROBERT WARREN (Moy View, Ballina).

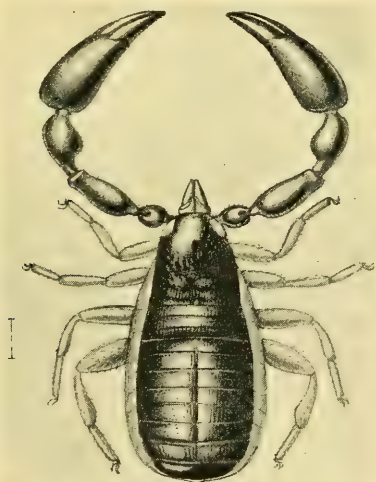
Wood-Pigeon Diphtheria.—Much public interest has been shown lately in the disease of which Wood-Pigeons have been dying so freely this winter. The subject is of considerable scientific interest; moreover, it is quite possible, although it has not yet been absolutely proved, that this disease, which is most infectious amongst Wood-Pigeons themselves, may also be contracted by other birds, especially game-birds. It is of great importance, therefore, to find a means of stamping out the diphtheria. Before, however, any effective means can be taken to eradicate the disease it is necessary to discover its origin. To the January issue of 'British Birds' Dr. C. B. Ticehurst, of Guy's Hospital, contributed an article on the subject of Wood-Pigeon diphtheria, and explained that it was due to a specific micro-organism called *Bacillus diphtheriæ columbarum*. At the same time Dr. Ticehurst pointed out that the etiology of the disease is most incomplete, and that much has to be learnt as to how it originates, when it comes, and as to its distribution before we can suggest a

remedy. The Wood-Pigeon disease forms an excellent case for a systematic inquiry all over the country, and many schedules of the questions to be answered have been posted. Much information and many specimens have thus been received, but more of both are needed, and I should be delighted to supply schedules to any of the readers of 'The Zoologist' who may be in a position to give information on the subject. All the observations will be collated and studied by Dr. Ticehurst, who will draw up a full report at a later date.—H. F. WITHERBY (326, High Holborn, London).

A Correction: 'Vertebrate Fauna of North Wales.'—In my recently issued book there is an unfortunate printer's error on p. 222 which exactly reverses the meaning of the sentence, making me state that the Buzzard is double-brooded. The passage as I wrote it ran thus: "The Buzzard *never* rears two broods in a year, *but* like most birds," &c. All readers who have copies of the book are earnestly requested to make the correction.—H. E. FORREST (Hillside, Bayston Hill, Shrewsbury).

ARACHNIDA.

Curious Habit of a Chelifer.—My friend H. W. Bell-Marley recently sent me from Natal two specimens of a species of *Chelifer* which he had found firmly attached to the principal vein of the wings



of a large Longicorn beetle (*Macrotoma natala*). It need scarcely be mentioned that the wings are membranous, and quite different to the strong elytra which cover them. Another species of *Chelifer* about

the same size but distinct from the one here figured has been described by C. J. With, of Copenhagen (Ann. Mag. Nat. Hist. xv. p. 123 (1905)), as *C. equester*, of which eight females and thirteen males were found beneath the elytron of a beetle (not identified) at Tavieta, Kilimanjaro. Some of the smaller species of the Pseudoscorpionidæ have been seen clinging to the legs of flies, a habit generally considered as denoting a convenient means of transport from place to place rather than an intention of preying on the flies themselves; but these specimens from Natal are much larger, and must prove a considerable inconvenience and annoyance to their hosts. The specimen here figured measures $5\frac{1}{2}$ millim. in length of body, and is apparently an undescribed species, but being in a dried condition is not suitable for specific diagnosis.—W. L. DISTANT.

NOTICES OF NEW BOOKS.

The Vertebrate Fauna of North Wales. By H. E. FORREST.
Witherby & Co.

THIS book is a real contribution to natural history, and pertains to a British area whose fauna required the historian. A number of papers on Welsh ornithology have recently appeared in our pages, and they are not unused in this volume; we hope that 'The Zoologist' will be equally in demand for records when a volume on South Wales appears. The work commences with short obituaries of the deceased zoologists of North Wales, and portraits of many of them give a peculiar value to the pages, while a good bibliography of the writings of living naturalists is also compiled.

Of the mammals, we read that at the present time 41 species are known to occur in North Wales, 8 became locally extinct within the historic period, while 15 have been identified only from remains found in limestone caverns of the prehistoric era. No list of mammals for North Wales had previously been published save that by Elyton in 1836.

Two hundred and seventy-two species of birds are enumerated;

of these 22 are recorded on doubtful evidence, 93 are residents, 52 winter visitors, 38 summer migrants, 17 chiefly occurring on passage in spring and autumn, 47 have occurred accidentally, and 3 are extinct locally; 143 have been known to breed in the district. The Reptiles and Amphibians are naturally not numerous, but 159 species of Fish are enumerated—27 fresh-water and 132 marine.

It will be evident from the above figures that Mr. Forrest has had to deal with a fair-sized vertebrate fauna, and he seems to have scarcely let a record slip the meshes of his net, supposing such a record to bear the imprimatur of authenticity. We have not made a microscopical search for errors, nor have we found any; one of the printer is corrected by Mr. Forrest himself in this issue (*ante*, p. 77). But we have looked for facts, and abundantly found them, analysed and well arranged. The book is embellished with a number of plates illustrating the haunts of different birds in North Wales, and it forms a notable addition to our now fast-increasing literature on faunal areas of Britain.

Birds of Britain. By J. LEWIS BONHOTE, M.A., F.L.S., &c.
Adam & Charles Black.

In a literary sense no naturalist is so well catered for as the British ornithologist, or the individual who is interested in British birds. Book follows book, one author inspires another, the supply is recurrent, and of course the standard is not always the same. Mr. Bonhote's volume, as might be expected, is not an ordinary compilation; it naturally does not reach the high-water mark of the late Mr. Howard Saunders's phenomenal condensation in his universally known 'Manual,' but it possesses originality and charm. It contains notes and observations which have "been taken at first-hand straight from Nature," and it is illustrated by one hundred coloured plates selected by Mr. H. E. Dresser from his 'Birds of Europe.' These features will alone distinguish the publication from many other works on the same subject, and make it an occupant of our shelves. Here at last is a book which will provide another judicious presentation to any lover of birds who would yet know more about them.

Guide to the Specimens of the Horse Family (Equidæ) exhibited in the Department of Zoology, British Museum (Natural History). Printed by order of the Trustees of the British Museum.

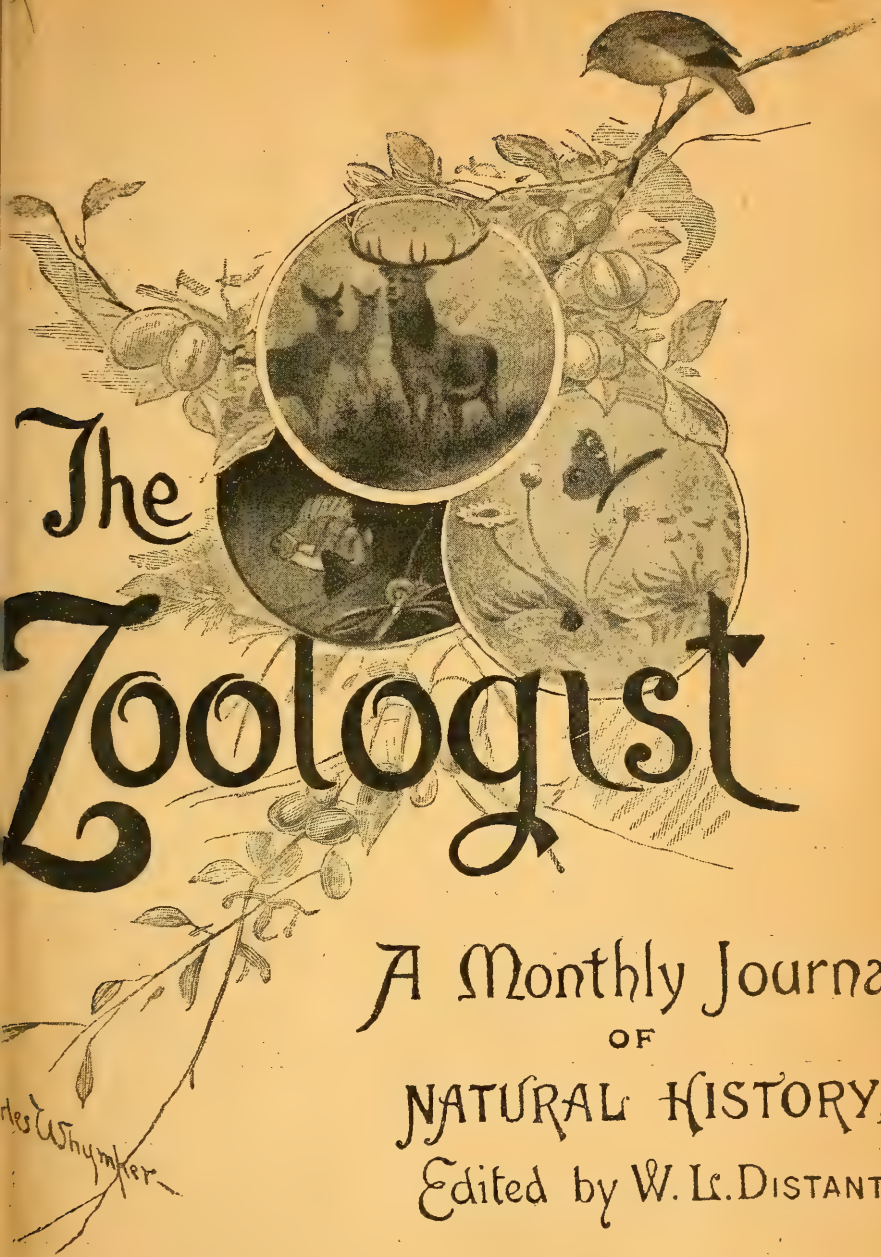
ALTHOUGH no name appears on the title-page, we read in the preface that this "Guide-Book" is the work of Mr. R. Lydekker. It is, however, more than a guide-book, and is practically a short but condensed memoir on the *Equidæ*, and as such is a publication to be remembered by students of the family. The National Collection now contains the skulls and some other parts of the skeletons of many of our celebrated thoroughbred racehorses, and their pedigree and performances are detailed in this small publication. This is a very welcome sign of the times, and a proper purview of a national and legitimate sport from the point of both the naturalist and the true sportsman is more likely to favour racing and the racehorse than the presence of mobs of gamblers at some plating saturnalia. We hope that the Museum will obtain many more of these trophies incidental to a national pastime and the improvement of man's noblest domestic mammal.

These pages are illustrated by twenty-six figures, and the cost of the publication is trifling.

Records of the Indian Museum (a Journal of Indian Zoology).
Calcutta.

THE Indian Museum at Calcutta has now followed the example of most of our Colonial Museums and those of other countries by publishing its own Journal. Parts i.-iii. of vol. i. have now reached us, and from the contents these 'Records' will be recognized as of considerable zoological importance. There is also an accompanying publication of a larger size, 'Memoirs of the Indian Museum,' the first part of which contains "An Account of the Rats of Calcutta," by Dr. W. C. Hossack, which is beautifully illustrated by coloured and other plates.

These publications reflect the energy of Dr. Annandale, the Superintendent of the Zoological Section of the Calcutta Museum.



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THE ZOOLOGIST

No. 801.—March, 1908.

SOME NOTES ON A HABIT OF THE GREAT SPOTTED WOODPECKER (*DENDROCOPUS MAJOR*) IN RELATION TO A SIMILAR BUT MORE DEVELOPED HABIT IN THE CALIFORNIAN WOODPECKER (*MELANERPES FORMICIVORUS*).

BY EDMUND SELOUS.

As is well known, a certain Woodpecker of North America—*Melanerpes formicivorus* to wit, known commonly as the Californian Woodpecker—has the habit, which, in view of its apparent uselessness, has been pronounced extraordinary, of studding certain trees with acorns by wedging them, in great numbers, into holes which it has previously made in the bark for their reception. The following notes (made in Sweden) on an analogous, but less irrational, habit of the Great Spotted Woodpecker (*Dendrocopus major*) may perhaps throw light on the origin and real meaning of the more peculiar one.

April 23rd, 1907.—To-day, on one of the islands of this lake, I was surprised to see, upon the stump of a felled Scotch fir-tree, at about a foot from the ground, a fir-cone set, apex upwards, in the bark, and so deeply that, had it been sliced off level with the surface, one-half of it would have remained where it was. Taking it off, I found that a groove in the thick bark of the Scotch fir had been made for its reception, which just fitted it,

and, an inch or two higher on the same side of the trunk, was another cutting made evidently for the same purpose. At the base of the trunk, and on the same side of it, thirty-eight fir-cones belonging not to the Scotch fir but to the spruce—as did also the one imbedded—lay strewed in a half circle, the outlying cones on each side reaching, together, to about half-way round the tree, and, directly under the two grooves in the bark, was a litter of the dust and “leaves” of fir-cones. Looking amongst this, I found what, from previous experience, I knew to be the droppings of a Woodpecker (no doubt *Dendrocopus major*), and instantly thought of the Californian species which studs a tree-trunk with acorns, and, extremely interested in what looked like an earlier stage in the evolution of the habit, I concealed myself at some little distance from the stump in question, and waited in the somewhat forlorn hope that the Woodpecker, if it really were one, would return to its hoard. I sat on for some hours, but nothing broke the lifeless stillness of the island. Meanwhile, however, I had noticed another Scotch fir quite near me, at whose base lay a very much larger heap of cones—also of the spruce—and, upon going up to it, found that its bark had been treated in just the same way. Here there were three groovings, two of the same general shape as the others, and each of these held firmly almost any cone of the heap that I picked up, though one was a good deal longer than any of them—which, however, though it made the shape less exact, did not at all affect the firmness of the fit. The third mould was smaller and more rounded, and appeared to be adapted for a smaller cone. This, however, as I soon found, was a wrong conclusion, for a little later I came upon a tree from which a cone projected outwards, as well as upwards, in a very striking manner. But for the bizarre outline thus presented, which at once caught my eye, I should probably have passed this tree, as there were but few cones beneath it, and these only strewn about, not forming a heap. This was also the case with regard to a fourth tree, in which, like the first, a cone was similarly inserted in a socket which just fitted it. I cannot now remember whether there was another empty one, and if so whether it was rounded or elongate, but on going back to the tree in which I had first noticed the latter kind of groove, and trying a cone in it, after the fashion of the pro-

jecting one, I found that it took it exactly, so that quite the same appearance was presented.

A fifth tree was interesting in another manner, for here the depression in the trunk was natural, caused, I think, by a branch having once sprung there. It was larger than the other, nor was the shape nearly so true, more resembling that of an inverted peg-top. Nevertheless, a fir-cone had been inserted in it, in the same manner, whilst one or two others lay on the ground beneath, though here, as in the two preceding cases, there was no heap. In every case the tree was a Scotch fir—the bark of which gives special facilities for such carving—and the cones always of another kind, apparently those of the spruce. Under all, or nearly all, these trees I found the excrements of a Woodpecker, and at the large heap some of these were buried under the litter of the desiccated cones, giving the idea that the collection here had been a work of time, the refuse of the last-brought cones falling upon and covering that of the former ones, and, with it, the bird's excrements, which thus lay at different levels. The grooves for the reception of the cones in this tree—where I more particularly examined them—had the appearance of having been first cut with a knife, and then worn by friction, some being smoother than others. This smoothness, I think, must have been produced by the constant placing of successive cones in the groove. The cones presented all the appearance of having been hacked at with a hard, pointed implement, and the refuse, much of which was like sawdust, was also to be best explained in this way.

April 24th.—After breakfast rowed to another island—the nearest to the settlement—in order to examine the trees there. The results of my investigations were as follows:—

(1) A fair-sized Scotch fir had one deep engraving in the bark, of a shape differing very much from those I had found yesterday. The chief difference was that, taking those as the standard, it was upside down—that is to say, the part corresponding to the tip of the cone pointed downwards, and, in proportion with its breadth, it was shorter. On the ground lay cones of the tree itself, and some of these seemed to have been pecked into. On placing several in the mould with the apex downwards, I found that all were effectually secured in it, even

the smallest ones becoming so by pushing them down towards the narrow part. This was not, however, the case with a corresponding number of spruce-cones that I tried, for though they were larger than the largest of those of the Scotch fir that I could find, and filled the hole more completely than they did, still the fit was not so good, nor the cone so secure. Yet I could find no Scotch fir-cone which quite filled the mould. This cleft was at a greater height than any I had yet seen (an inch or two higher from the ground than the length of my walking-stick camp-stool, which would be about three feet). There was no heap of cones, nor did I find spruce-cones strewed with the others near the trunk, but had to fetch them.

(2) On another Scotch fir were three such niches, at different heights, of the same shape, but not so well made, and in the highest of these—the height of my chest from the ground—a small Scotch fir-cone, not more than one-third of the length of its niche, was squeezed tight and firm towards the narrower, downward-pointing end, with the apex up—*i.e.* against the shape of the frame. The other groovings were lower, but the lowest over two feet from the ground. No heap and no spruce-cones that I could see.

(3) Another Scotch fir had three large spruce-cones lying close to its trunk, with others some yards off, but all, it seemed, must have been brought. In the trunk of this tree, however, I could find no cleft. There was no heap. It is, however, possible that these cones had belonged to felled trees which had been removed, for there was a huge *débris* of shavings of the inner bark. Yet I could not make out that this had been the case. The fellings seemed to have been of Scotch firs.

(4) On another Scotch fir, at about the same height, there was a quite small and roughly-shaped cleft—not so deep—into which a correspondingly small cone of the tree stuck, when I placed it there, very well. No heap. One spruce-cone, which must have been brought, lay near the trunk, and this was well pecked, from the base to near the middle, on one side.

(5) A Scotch fir in which was a long, narrow grooving of a foot, or near that, in length, its base being nearly three feet from the ground. Here no attempt seemed to have been made to approximate the shape of the groove to that of a cone, yet a

cone of the tree, that I tried, stuck in it very well. We seem here to see the beginning, or, more probably, an early stage of the habit. Some inches below this long cleft was something that may have also been one, with more idea of shape, but very rude and rough. There was no heap and no transported cones.

(6) A more shapely cleft, about two feet from ground, but looked old. No heap, no transportations. Always the Scotch fir. Shape an oval. Could not distinguish apex from base.

(7) Ditto, but fresher, with pecked cones of the tree lying about. Apex down,* height from ground some two feet.

(8) Something that may have been a natural cleft, into which, judging by the pine-needles it contained, cones may have been placed. About same height from ground.

(9) A fairly well-shaped cleft, to take the average Scotch fir-cone. The apex down. Some cones of the tree, well-pecked, on ground, and one spruce-cone—apparently unpecked—that must have been brought, but was too large for the groove.

(10) A somewhat small niche. Shape approximating to oval but apex—if any—rather up than down.

(11) Ditto. Height from ground $2\frac{1}{2}$ to 3 feet. Apex down but roughly shaped. No heap (as in all). Pecked cones of the tree—one pecked to pieces. No transported cones.

(12) A well-marked cutting, of the spruce-cone shape, the apex down. Underneath, but not quite in line with the cleft, and from six inches to a foot out from the trunk, a heap of the pecked or broken-out “leaves” of a spruce-cone, with other spruce-cones lying about that must, I think, have been brought. One of these seemed to have been pecked, but the others not, or only very slightly, at the base. Picking one to pieces I found it contained some small white grubs which would, no doubt, be palatable to a Woodpecker. I noticed here, just by the trunk, the excrement of a Woodpecker, which upon examination I found to contain what I took to be the hard parts of ants (but this, as will be seen farther on, was a mistake). Some cones of the tree itself—the Scotch fir, as in every case—seemed to have been pecked, but they were old, and it was difficult to tell.

* It would be easier for the bird to peck it out so, and this is no doubt the reason.

There were other examples of this interesting habit, but these must suffice. There was nothing in any of them quite like what I had seen on the other island, about a quarter of a mile off. In no case, there, could I see signs of the Scotch fir-cones having been eaten. Going again to this island, I could not find that any change had taken place in the disposition of the cones, &c., at the two principal depots, but with a view to testing this another time, I placed two, each in a groove, above the larger heap, to see if they would be moved, and rowed on to the next island, some ten or fifteen minutes away. Here, however, with the exception of some half a dozen quite small spruces, there were Scotch firs only, and accordingly I found no example of the cones of the former tree having been brought to them. All about I found trees marked in the way I have described—there is no need further to particularise—and in several of these cones were so tightly stuck that they offered a sharp resistance to being pulled out. They were at various heights, generally above two, and in one case nearly four, feet from the ground. No heaps. When the niche was not oval, or nearly oval, the apex or narrow end of it pointed down. The conditions on two other closely adjacent islands being the same, I did not land upon them.

Some days afterwards I found the two cones which had been placed by me in their niches exactly as I had left them. This, with various other indications, assures me that the present time of the year is not that at which the Woodpecker which makes these clefts and brings the cones to them occupies itself in this manner.

May 2nd.—Towards evening I rowed to the nearest island to get a specimen of these clefts made by Woodpeckers in the bark of the Scotch fir, with cones of the tree fixed in it. I found one, but also noticed another, in which a perfectly new-looking spruce-cone was fixed, projecting and upright—a most eye-catching object. How I can have missed it before, the island being small and thinly grown, I hardly know; but I have no reason to think that the birds are now at work in this way.

May 5th.—The other day I examined the Woodpecker's excrements which I had found on one of the islands, under the circumstances described, with a Codington lens. After some

time, during which I was in doubt, I made it out to consist of minute fragments either of fir-cone or fir-wood, but, taking everything into consideration, I have no doubt the former. It was difficult, at first, to be sure, and, as I say, I was in doubt for some time. There were great numbers of little flakes, some entire, when they were of an oval shape, forming a cavity on one side, whilst others seemed to be chips and breakings of these, and were of various irregular shapes. The entire ones looked something like the shards of beetles, but minute examination never bore this out, but showed a woody grain in them. I compared the substance of these excrements with some of the small flakes and *débris* of the cones amongst which I had found them, and, though the latter showed lighter, the difference was no more than might have been accounted for by the one having been exposed to the digestive processes and passed through the intestines of a bird. I could not find one head, leg, or other recognizable portion of any insect. All was the woody material, and as the entire excrement was thus composed, and I examined half a dozen or so of them, we seem here to have a Woodpecker feeding entirely on fir-cones, having thus—for a certain time of the year, at least—exchanged an animal for a vegetable diet. The question arises whether these woody fragments were in all cases the seeds of the fir-cones, or portions of them. This is the theory, but I myself suspect that, from the seeds, the bird has come to feed upon the actual wood of the cone, and the desiccated and even powdered condition in which some of the cones, forming part of the large heap, were, goes to support this view.

During the following winter I was in Germany, and from towards the end of December, and through the greater part of January of the present year, I watched the Greater Spotted Woodpecker actually feeding in this manner, but here the cleft in which the cones were placed was high up in a small stump-like branch, denuded of bark, which rose upright from the centre where the trunk bifurcated. The tree, as in all the other instances, was a Scotch fir. This is just as described by Brehm's father (as quoted in Brehm's 'Thierleben'), who says that he only once saw such a hole in the *bark* of a Scotch fir (*Kiefer*) near to the ground, and adds that it was but little used. In the

‘ *Natürgeschichte der Vögel Mitteleuropas* ’ much the same account is given, but the cleft in the bark is spoken of as though it were resorted to somewhat oftener. In Sweden, if I may judge from these islands, and from some little heaps of cones near the trunks of trees which I have passed in the forests, without paying special attention to, the latter represents the common practice. In both the accounts I have mentioned the bird is described as going to the top of the tree in which its cleft is situated and bringing cones to it from there, but, for once that the one I watched did this, it must have flown half a dozen times and more into other trees for them—usually into one or other of two that were quite near, but sometimes into others a little way off. No mention is made in either work of the cones of the spruce, or any other fir tree, being placed in holes made in the Scotch fir. It is obvious that as long as the bird stayed on its own tree, so to speak, this latter interesting development could not arise, but, as soon as it flew into others, the long, fine cones of the spruce might offer greater attractions to it than the small ones of the Scotch fir. The latter, however, is the only tree of its kind which seems adapted for the making of these clefts.

From the above observations the evolution of this habit may perhaps be traced. It seems probable that, in the beginning, the bird kept to the higher parts of the tree, and, instead of making a niche, utilized one that it found. Brehm’s father speaks of its hacking a hole on the upper side of a *split* (gespalteten) bough, and one of the clefts of the trunk in which I found a cone inserted was certainly a natural one. From this to improving any such accidental facility would be a short step, but from the top of the tree, where the bark either of trunk or bough presents no special facilities, to near the bottom, where it is thick and full of chinks, seems a long one, nor can I think of any intermediate halting-place, as long as the cones of the Scotch fir alone were the attraction. But once let those of the spruce be attacked, and their size, even if detached by the Woodpecker itself from the bough on which they hung, would present an obstacle to free transportation through the air. They would probably either fall at once to the ground, or gradually drag down the bird, who would then have to get them to its tree either by dragging them,

or in repeated short flights at a low elevation. The tree reached, however, there would be no possibility* of getting them to the top of it, and the Woodpecker would have either to abandon its meal, to eat it on the ground, or to make a new niche near the base of the tree. In deciding on the latter course it would be urged by an already confirmed habit, which, however, would not prevent it making more or less use of the natural chinks of the bark, improving them by some additional grooving, and from this coming gradually to make a mould approximating somewhat to the actual shape of the cone. Of course, when the bird had once got, in this way, to the thick, chinkey, and comparatively soft bark, its advantages for being thus used would be apparent, and one would not expect it, for long, to carry large cones to one part of the same tree and small ones to another.

The object with which the Greater Spotted Woodpecker thus inserts fir-cones into niches which hold them is, of course, that he may the more conveniently peck down upon them, and thus extract their seeds. There is no question of storage—of providing food for the winter. The food is all about, and the bird feeds, in this way, from the middle of August, according to Brehm, to February or later. I last saw it doing so on January 19th. Therefore, the fact that the Californian Woodpecker—which inserts acorns into holes that it makes in the bark of a tree in much the same manner—does not do this in order to provide food for the winter, inasmuch as it migrates during that season, does not strike me as extraordinary. It does so—or, at any rate, I have little doubt that it once did—in order to eat them conveniently. The strength of the habit has, however, increased upon it, so that, instead of using each acorn, as it is placed, it yields to a feverish anxiety to place another and another—nor is it for any better reason, as I am convinced, through watching them, that many birds build several nests in quick succession. Most people have felt the difficulty of stopping from some trivial mechanical work which they may have occasion to do, but which there is no need for them to do all at once. However banal, the thing, if it be easy, is apt to become a pleasure, and there can be little doubt, I think, that the Californian Woodpecker experiences a strong and active pleasure in making

* Or, at least it would be, I should think, very laborious.

his holes and inserting his acorns. As soon as he has finished one he feels, so I explain it, an impulse to begin another, and so on. I see nothing wonderful in this, but if, all the time, he were to be thinking of the coming winter, and how he would then enjoy the banquet he was now getting ready, I should think that wonderful. Never having been in America, I cannot, of course, say whether, or to what extent, the Californian Woodpecker now eats the acorns that he so busily studs the trees with; but that he once did so—or something inside them—and that the habit commenced with this object seems pretty plain both from the analogy of our own European species, and also because it is difficult to imagine another origin for it. But let a thing be once done with *acharnement*, and, where the reason is not strong enough to prevent this it is always liable to be done for its own sake—for the mere pleasure of the doing, which may come, in time, to eclipse or obscure the object for which it was at first performed. With birds it has always seemed to me that this is particularly the case, and the true philosophy of many of their actions must, I believe, escape us, if this principle is not kept steadily in view. But why then does not the Greater Spotted Woodpecker leave fir-cones uneaten, or but little eaten, all over the trunks of trees? The strength, and consequent blindness, of an instinct bears probably some relation to the number of generations through which it has descended, and the one in question may have had a later origin in the one species than in the other; with our own bird, in fact, it may be still a habit only, and not a true instinct, for that the first does, in some cases, pass into the second, there can, I think, be little doubt.* Habit or instinct, the custom is certainly one which two or more Woodpeckers might very well have developed independently, and the fact that it is not common to the family as a whole is evidence that such has been the case. But does the European species show no traces of a disposition to follow in the footsteps of its American relative? I think myself that such traces can

* Or rather I had better say that I think it likely, myself, that habits are inherited. Is not the blind performance of what seems obviously by origin a habit some evidence of this? Why should a creature starting only from its own individual experience, and thus acting at first intelligently, become such an automaton?

be detected. Some of the trees, for instance, which had been put to this purpose had not one niche only, but two or more close to each other. Moreover, the blindness of any instinct may show itself in various ways—for instance, where *Melanerpes* has come to place many acorns in as many holes, *Dendrocopos* may be getting to place an unnecessary number of cones, in accelerated succession, in one and the same hole. As to this, I noticed that many of the cones which the bird I watched had scattered about beneath its tree had been very slightly pecked, and also that though to fetch another cone was the inspiring motive of every little journey it made into trees near about, yet sometimes it would come back without one, as though the recollection of a cone left unfinished had suddenly crossed its mind. It would then go on pecking at the cone it had left, which, as a rule, was thrown out only when it returned with a fresh one. Many cones having just the size and appearance of those habitually chosen by the bird were intact, but I could not be perfectly sure that these did not lie as they had fallen themselves. This could not be the case, however, where transported cones of the spruce lay beneath a Scotch fir that the bird had worked upon, and a certain number of these showed no signs of having been pecked, which was, moreover, only slightly the case with some still sticking in the niches. These facts offer, perhaps, some slight evidence that something irrational or non-purposive may have begun to mingle with the habit or instinct, even in the European species. In conclusion, I would suggest that the best way of properly understanding very developed habits in one species is to study less developed ones, of a similar character, in another species.

I have mentioned the small—but by no means minute—white grubs which I found living within some of the cones. In these, instead of in the seeds, we may perhaps see the Woodpecker's original object in pecking open the cone. I found these, however, in the spruce- and not, as far as I recollect, in the Scotch fir-cones, and if they, or some other creature, do not inhabit the latter, this explanation will not serve. Yet it is unlikely that, when the cones of one fir are inhabited, those of another should not be.

NOTES ON THE OTTER (*LUTRA VULGARIS*).

BY W. PAYNE COLLIER.

FOR many years now I have taken a great interest in the doings of the Otter. Not only has this crafty animal given me much pleasure in following in its chase, but more since I found out it was of the greatest use towards the preservation of Salmon and Trout. This may seem to be somewhat conflicting, but the matter will be explained as my paper proceeds. Of course, every rule has its exception, and I will admit that under certain conditions some rivers would benefit by its absence, but these being the minority they must necessarily give place to the majority. Though I have watched the habits of the Otter to some extent, I know there is still much to be learned. But year by year this is becoming more difficult to carry out. None of our wild animals are more sensitive to the presence of the human being, and by the increase of anglers, which is so greatly in evidence, it becomes harder and harder to get within sight of them, the Annual Report issued by the Board of Agriculture and Fisheries showing that the increase in the Sale of Trout Licences alone is 56,871, per Government Report, 1905. What I have just said is only too well shown in the Otter having earned the name of "wily," and, to show its craftiness, it may be stated that when a trap, either of steel or wood, is set to catch them, it will generally be six weeks before they will again approach the spot on which it is placed, notwithstanding that it may be right in the middle of their regular path for years previously. I have mentioned anglers in the matter of the research, as no one is better placed to obtain information on the subject. Fly-fishers' movements are slow and silent, and therefore many more practical instances of the natural history affecting our rivers can be witnessed by them.

Until within the last few years it was supposed that Otters

were only to be found in the solitude of the least inhabited portions of the country, but this theory has gradually exploded. All our rivers having short courses to the sea are frequented by them more or less at different seasons of the year, which has been proved by successful hunts which have been carried on, where only a few years ago their presence was unknown and unthought of. The Otter breeds in two different seasons of the year—spring and autumn—but whether the same animal breeds twice I am unable to say. Choosing some “holt,” as its underground workings are called, well away from the haunts of man, they will make a nice comfortable nest of dry grass and other soft matter. Here they produce and bring up their young until old enough to forage for their own living. While they suckle the mother they render her powerless to leave any scent by which either hound or dog could trace her to her lair. When under the mother’s care she is most attentive, watching over their welfare with as much motherly affection as will one of our own species with her firstborn, and in evidence of this I once saw a good illustration.

Fishing up the River Tamar, through the Duke of Bedford’s beautiful domain called “Endsleigh,” by Tavistock, in Devonshire, as I rounded a bend in the stream I suddenly “gazed” an Otter close to the edge of the water, trying to take hold with her mouth of what looked like a little lump of fur, but which wriggled and kicked to such an extent that she found some difficulty in attaining her object. In a moment, however, she seemed to be aware of my presence, though her back was towards me, and, making a final and successful grab, with a rush she took the water, and on landing on the far side at once disappeared in one of the many gutters with which these beautiful gardens are drained. Though her whole body was exposed to my view right across the river, she completely hid her cub.

In this same neighbourhood I also saw another instance of their affection. As I was about to leave the river, after wading up a “stickle,” suddenly I saw a wave coming down the pool above me (all Devon rivers beyond navigation are pools and stickles), as though a large fish had jumped, but in a moment I saw two fair-sized cub Otters quickly swimming round and

round in circles, as though looking for something, and at the same moment there rose about five yards above them a full-grown Otter, to which they hurried with great excitement, emitting as they swam a soft, low, whistling sound, no doubt of pleasure. This evidently was one of their parents. But the fun had not finished yet. On reaching its side they were fondly caressed, and then began a game something after what we in our childhood used to call "king of the castle." First one cub would creep on to the parent's back, only, however, to be pushed off by its mate, and *vice versa*—the large Otter now and again, when the game got too troublesome, sinking slowly under water, submerging the whole of the players. This continued for some few moments, when by a sudden slipping of my foot their notice was attracted, and before you could say *one* they had all disappeared; but by my experienced eye I hit the "chain" of the big one as it dived across the pool, and also that of the cubs—in much smaller globules, of course—as they made the nearer bank.

However, though so affectionate to its offspring in their early youth, as soon as they get old enough to take their own part in life their fondness seems to disappear, and both their father and mother become their bitterest enemies. Naturally a river, or portion of a river—and no doubt Otters have their own little kingdoms—will not supply above a certain amount of sustenance, and therefore, as soon as their young begin to want their fishy food, they are driven away to seek their living in fresh pastures.

Generally they go down stream, and continue, if the lower sections are occupied by other Otters, to the estuaries, where they live on Plaice, Dabs, and no doubt Conger, when they are in luck; and from evidence I possess are often taken for Seals, for they sometimes occupy the caves on the coast, as I found on examination in those under the bold headlands at Tintagel. Should a dog or bitch Otter meet with an untimely end, though even many miles from the mouth of a river, in a few weeks, or even sometimes days, the survivor will be joined by another of the sex required, and if the new-comer should have the bad luck to be killed before its comrade with which it has connected its fortunes, it will be found to be younger than the one previously despatched. From experience I should say that they are driven

from home when about ten weeks old, as few have I seen killed or have been reported to me as having been met with between the age of mere cubs and that of youngsters of about eight or ten pounds. There are exceptions naturally, but these may have been allowed to remain through late maturing or illness.

The food of the Otter is supposed by many to be only fish, and that of the choicest kind; but this is a mistake, except in the case of Eels, which have been proved to be inveterate poachers of fish, particularly the spawn, and in these circumstances many of our rivers containing Salmon and Trout, or even coarse fish, would now be destitute of fish-life—or perhaps I had better say nearly so—had it not been for the Otter. Frogs inhabit the greater number of our rivers, and it has been proved they will devour more fish in the ova stage in a few moments than an Otter would kill in a year. Now, it has also been proved that there are no creatures of which Otters are fonder than Frogs, and for which they will travel many miles. From my own knowledge of the fact I could quote many instances, but one will answer the purpose of a dozen. Once early one morning I was passing through a wood standing on a hill to get some fishing on a river other than that I generally fished. As I approached the top of it I thought for a moment I saw a Fox creep across the path I was travelling, and at once the cry “Tally ho!” rose to my lips. But as the creature I had “gazed” came through the bushes out into the open space beyond, I saw it was an Otter. Immediately my curiosity was aroused as to what had brought it thus far from a river, nearly two miles, and on looking round saw there was a moderate-sized pond about fifty yards away. Going to the edge of the pool of water, I looked carefully round it, and within a few feet of me were the remains of a Frog, from which no doubt my approach had frightened it. This and other incidents seen by myself, and also those related to me by others, whose word was beyond doubt, have led me to know that where Frogs abound the Otter is the greatest protector the fish preservers can have.

And again, as I have said, Eels are desperate poachers, not only of ova but even of the fry of fish, and of the truth of this I have had many optical lessons. It was one of these which first brought to my knowledge what a friend Otters were to the angler.

While I sat one summer's afternoon over a large, clear, crystal pool, watching the fly-life float down—being at the time particularly interested in the matter of fly-tying—I suddenly heard a splash in the water near at hand, and looking down I saw an animal travelling up on the bottom of the river, which I at once knew to be an Otter. But what surprised me most—my first surprise was that it had not detected me before it took the water, knowing how keen they are—was that, instead of tackling several Trout which lay lazily in its path, it contented itself with turning up stone after stone with its snout in search of food of some kind, which it evidently hoped to find beneath them, as from several I saw it grab something, and then go on to the next. All at once, however, it made a great rush forward, and I saw it catch an Eel, which evidently had heard it coming and tried to slip away. The Eel was about a foot long, and with this it seemed content, for coming to the surface it began to go gently down the stream, but, catching sight of me, it again dived and hurried off under water at a pace it would seem almost impossible for it to attain. This instance, as I have already said, was my first authority for saying that Otters were the friends of the angler, *if kept, however, to a proper level*, and this has now been done nearly all over England by the institution of Otter hunts, which in themselves have increased wonderfully in the last ten years.

As to the size of the Otter, I believe twenty-nine pounds is the heaviest yet scaled, though of course there are unauthenticated reports of great weight; and as to their age, if the teeth are any guide, it may be assumed they live about as long as a Dog, but this is a matter on which I have no evidence.

However, if these brief notes do not explain the whole matter, still I hope they will throw some little light beyond that which has already been published on the history of what I have called, as an angler, “my friend the Otter.”

CAPTURES AND FIELD REPORT FOR NORTH DEVON FOR 1907.

BY BRUCE F. CUMMINGS.

THE following natural history notes on the occurrences of different species of animals in North Devon during the past twelve months, or so, are chiefly the result of my own observations made at different times, and also of the notes of other observers who have been kind enough to communicate them to me. I am especially indebted to Mr. H. H. Hamling for help and observations on the birds.

MAMMALS.

Stoats and Weasels are very numerous here. During January, 1907, it is said that the keepers of Sir John Amory had nearly one thousand Stoats alone hung up on the keepers' trees. In spite of the large numbers of these vermin they do not appreciably diminish the quantity of Rabbits.

At the beginning of last year a large number of the Rabbits caught in North Devon were found to be affected with large hydatid cysts, caused by the first stage of a Tapeworm (*Tænia cœnurus*, Cobbold). In order that the worm may reach maturity and complete its metamorphosis, the Rabbit which it affects must be eaten by the Dog. One of these Rabbits which I examined showed, on being skinned, a large watery swelling on the rump, about the size of a plum. Inside were a number of round "white heads." These vesicles contained the microscopic embryos which are provided with a useful set of paired hooklets on the anterior side. The probable cause of this widespread malady was no doubt the very wet weather, which would favour the prolonged existence of the ejected ova until cropped up by some unfortunate nibbling Rabbit.

In May last year a Polecat (*Putorius fœtidus*) was reported to have been caught in a Rabbit-trap at Combemartin. I made inquiries, and have come to the conclusion that the report is

correct. The specimen was not preserved. It seems that Mr. R. Adams found the animal, and he described it some time afterwards to Mr. W. H. Loosemore. Mr. Loosemore writes to me saying that the specimen was a male, two feet long from head to tip of tail, of a dark grey colour, white breast; tail about six inches, slightly bushy; it stood seven or eight inches high; and he remarks in conclusion:—"Mr. Adams says it was the size of three Ferrets." This is not very exact evidence, and it is a thousand pities that the animal was not preserved. Mr. Loosemore himself has seen three Polecats alive in the High Bray district, but not within recent years. The last specimen caught here was, I think, in the Taw Valley in 1887, by Messrs. J. D. Prickham and Williams ('Victoria County History'). A trustworthy Parracombe gamekeeper reported seeing a Pine Marten (*Mustela martes*) in the woods at Hunter's Inn a dozen years ago, but the last caught is in the possession of Mr. C. Bailey, of Ley Abbey. It was caught fifty years ago. A tenant of Mr. Bailey tells him that he caught another in the woods at Lee about forty-two years ago.

Four white Moles (*Talpa europæa*) have been captured: one at Arlington, two at Bishopstawton, and one at Swymbridge. Two more were reported captured at Combemartin.

On Jan. 28th this year the Hamburg-American liner 'Fuerst Bismarck,' when steaming at full speed near Corunna, was charged by a Whale. The Whale became disabled. On Feb. 2nd the captain of the steamer 'Peggio,' on arriving at Plymouth, reported sighting a dead Whale drifting towards the Bristol Channel. A little later the Whale was stranded at Hartland Point. The exact locality where it is now lying is on the rocks at Cow and Calf Point, near the Hartland Lighthouse. When the coastguardsmen first saw it floating on the water they thought it was a capsized yacht. The trouble is how to dispose of the Whale, as it is making its presence felt by its horrible effluvium. This Whale is evidently a Rorqual, and I believe it can be no other than the Common Rorqual (*Balenoptera musculus*), but I have not seen it. It measured in length over sixty feet, and was ten feet across the lobes of the tail; a male, with long and distinct throat-folds; the baleen was "over two feet long"; its colour was pure white underneath and black above; the flipper

measured "over five feet." I am indebted to Mr. T. C. Burrow for most of this information, and several other sightseers have borne witness to its length, most of them saying that it was over seventy feet in length, which it very probably was. Hundreds of people from all parts have gone to see it. The rocks for many hundreds of yards are white with the fat rubbed off as it was washed along by the current before being stranded.

Dolphins and Porpoises are common. One of the latter was found sporting in the River Taw, only two miles below Barnstaple.

BIRDS.

Dec. 27th, 1906.—This afternoon I saw a pair of Green Sandpipers on the Taw near Tawstock Woods. They occur here all through the winter months. The severe frost and fall of snow have sent into the valley numbers of Wild Geese. Wild Swans have also been seen in the estuary. A longshoreman got close to two Swans which were engaged in a fight. Five Swans were observed frequenting the Braunton Duck-ponds, and two were shot. They proved to be Whoopers (*Cygnus musicus*). Others, again, were seen in the marshes opposite the Barnstaple Town Station. A flock of fifteen were observed at Bude. I found seven Little Grebes in a flock on the river at Wrafton.

Jan. 1st, 1907.—I received a Golden-eye duck shot on the Taw.

18th.—A White-fronted Goose in a Barnstaple poulterer's shop-window. On inquiry I found that it had been shot at Bideford.

Feb. 7th.—Examined an immature Smew (*Mergus albellus*) shot on the Taw. Several Tufted Scaup on the Duck-ponds at Wrafton. Ever since the snow the Peewits have been in enormous numbers.

10th.—Watched a Dipper feeding. It flew out from the side of the river, and hovered over the water like a Kingfisher, and then it dived in. I waited for it to reappear, but it did not rise to the surface of the water like a Duck, but on reaching the bed of the river it must have got a hold on the little stones in spite of the current, and then walked along the bottom to the shore, where the first thing I noticed was its white breast. Later in the afternoon I saw this same bird swimming on the surface of the

water. It concluded a very interesting performance by first hopping on to an overhanging bough ; then, having turned himself round to face me, it began its beautiful song.

March 9th.—" An albino Linnet caught at Swymbridge " ('North Devon Herald').

April 1st.—The Ravens are nesting at Baggy Point. In the Rabbits' holes in the cliffs near Vention cottages several pairs of Stock-Pigeons are nesting.

May 8th. — A Tree-Creeper's nest behind the bark of a Mazzard tree. Nothing can be more fascinating than to watch the home affairs of these delicately built and confiding birds. The male feeds the female as she sits.

14th.—Dipper's nest on River Yeo, placed on flat top of a three-cornered buttress of a bridge over a waterfall. Three eggs in it. A couple of feet away a Grey Wagtail was feeding her young in a nest among the ivy of the bridge. Both species are very common breeding birds in North Devon.

18th.—In a field, among coarse sunburnt grass surrounding the Duck-ponds at the mouth of the Taw, was a Common Duck sitting on eight eggs. Nearer the water was another nest, which had evidently been marauded, as some eggs were broken, and others lying outside the nest. In the same field, in the middle of a clump of coarse grass, was a Teal's nest. The eggs were hidden by a screen of dry grass, for the old bird was not sitting. There were eight eggs. The Teal has not been recorded as a North Devon breeder hitherto, although it breeds on Slapton Ley, in South Devon. I noticed a Teal on the Wrafton Duck-ponds, which evidently had a nest not far away. The game-keeper (J. Petherick) told me that he had seen the female Teal on this nest, and had flushed her from it several times. A Red-start on Braunton Burrows.

20th.—I watched a Peregrine Falcon sitting on three eggs for a greater part of the afternoon. The eyrie was situated in a cleft of rock half-way up an almost sheer piece of cliff. She could not be got to move, although we threw stones against the rock, hallooed, and, generally speaking, made a pretty frantic row amid the stillness of the Falcon's sanctuary. On a previous occasion she was found to be off the eggs ; then, after screaming and flying in and out of the bay, she at length pitched on

a pinnacle of rock near the eyrie, and afterwards flew into the cleft and walked on to the eggs. The pair of Lesser Black-backed Gulls are breeding in the middle of the Herring-Gull colony again this season at Baggy Point.

22nd.—I saw a great number of Curlews on Exmoor to-day. The majority appeared to be breeding. Also a large number of Black Grouse. The stronghold of the Grouse in these parts is Exmoor, but they are to be found in small numbers on all the commons and heaths neighbouring on the moors. They used to be seen plentifully on Codden Hill, near Barnstaple, but I believe they have been held to be extinct in that district for some years. It was therefore with some pleasure that I disturbed a Greyhen from among the heath on Codden Hill last winter. This spring Mr. Hamling struck across a Greyhen with a brood of youngsters, which could scarcely fly, on this same hill, near Bishopstawton. Evidently, then, one pair bred there this season. I noticed a Gull-Bunting at Bratton Fleming.

25th.—A Sparrow-Hawk's nest in a poplar tree at Santon, containing five eggs, and lined with bark. Somebody removed these eggs to-day. However, by June 28th apparently the same pair of Hawks had utilized another nest in a poplar about three yards off. This nest was also lined with bark, and contained three eggs (hard sat), and with very little dark pigment on them. The old bird returned to her nest after a few minutes, first pitching on a twig near, and then bounding in handsome style on to the rim of the nest, when she slowly walked in and covered the eggs, leaving to view no more of her handsome form and bold colouring than a long barred tail which protruded over the edge of the nest.

25th.—A Burrow-duck sitting on six eggs in a round chamber seven feet down a Rabbit's burrow on Braunton Burrows. It is always an easy matter to find a Burrow-duck's nesting-hole by observing the scraps of down and footmarks at its entrance. Otherwise the great secretiveness of this bird with regard to the nesting-site shows a very perfected instinct. But the whole of her vigilant care is thrown away and at once counteracted by the leaving of down at the mouth of the hole.

June 5th.—By kind permission of Lady Chichester, of Arlington Court, I visited the heronry situated in the Arlington grounds.

It is one of our two small North Devon heronries. The nests are built on firs and other trees on an island in the middle of a lake. Three Buzzards were circling over this lake as I arrived. The Herons seemed alarmed, and replied to the cries of the Buzzards with dismal croaks. Of the dozen nests or so only three were being used. The young birds were well-grown and making themselves heard. The gamekeeper told me that twenty-five years ago the Herons were far more numerous. At that time they used to nest not only on the island but in the trees up the hillside. He also said that he had recently shot a "horned Owl" in the woods. I have seen the Long-eared Owl in fir-woods near Codden Hill, and I expect it is more or less common among our large tracts of larch and fir, though not often seen.

7th.—A Spotted Flycatcher nesting in Venn Bridge for the third consecutive year. Watched a male Stonechat violently chasing a small Tortoiseshell Butterfly.

8th.—A brood of little Burrow-ducks trotting at a big pace over Braunton Burrows towards the water. The parent showed great agitation. It was a very funny thing to watch this little crowd toddling over the sand. Here was the struggle for existence brought clearly before me in practical working order. Those that could not keep up were hustled by the stronger ones, and gradually left behind.

28th.—A white Lapwing shot at Braunton. A Red-backed Shrike feeding fledged young on Braunton Great Field. Saw a pair of Reed-Buntings on Braunton Marshes. They are exceptionally uncommon in the Barnstaple district. The Yellow Bunting is easily the commonest. Then comes the Gull-Bunting which, though not common, is somewhat widely distributed; while the Corn-Bunting is very numerous, but local, as it is only found near the coast.

August 28th.—Considerable numbers of Sanderlings (*Calidris arenaria*) on the River Taw. They remained for about a week.

October 8th.—A Quail shot at Harberton, South Devon.

January 5th, 1908.—After some hard weather I saw a Grey Phalarope and three Bar-tailed Godwits on the mud-flats of the Taw.

10th.—While in some woods at Bideford with Mr. A. J. R. Roberts, we both noticed how common the Bullfinches were.

Coal-Tits, too, seemed far more plentiful than I have ever seen them at Barnstaple.

FISHES.

Barnstaple is not a good centre for an ichthyologist. It is too far from the coast. Hence I feel sure that a large number of interesting captures escape me, especially those that occur at Clovelly, for example, which is almost as secluded and inaccessible as Lundy Island. I have not been able to do any dredging for myself.

On May 23rd, 1907, an Opah (*Lampris luna*) was discovered on the shore at Woolacombe Sands. Mr. R. Hadden, a visitor, noticed what he thought was a red flag standing in about a foot of water, but on approaching he saw that it was the dorsal fin of a dead or dying fish. He pulled it ashore, and it was taken to the railway station. On its way to the Royal Albert Memorial Museum at Exeter it was stopped at Barnstaple, where I saw it. Its length was 3 ft. 2 in., and it was said to weigh 140 lb. The colour of the flesh was yellow, and it was badly rubbed on one side; otherwise it still retained to a certain extent its glittering colours—red fins, round light spots, and sheens of purple and silver. Nothing was found in its stomach except a quantity of green slime. The last taken in Devon was, I think, in 1772, at Brixham; it weighed 140 lb., and measured as much as 4 ft. 5 in. long.

Numbers of Thickbacks (*Solea variegata*) in the Exeter market during May last year, taken on the south coast.

The Clovelly Mackerel fishing last season was considered worse than in the previous year. Their Herring season was very poor, as it was at all the fishing ports—Combemartin, Lynmouth, and Ilfracombe. This makes the third season in which the famous “Clovelly Herrings” have fallen off. A slight improvement, not maintained, set in during the early part of November, the boats averaging one hundred and twenty each, while one man secured a “mease” (six hundred and twelve). The fish taken were of very good quality.

The River Taw Salmon fishing was a very distinct improvement. About the beginning of last September some very fine catches of coarse fish—Bass, Mullet, and Flounders—were taken in the Taw. About this time there were shoals of small Grey

Mullet from one to three or four inches in the rock-pools and pools on the banks of the Taw. They disappeared later in the autumn. One shoal lived in a pit covered every day by the tide for about a fortnight. They were always to be found at low tide floating in this pool, with their snouts well above water, like half-submerged submarines, facing the mouth of a gully which was emptying itself into the pool.

A small Sunfish (*Orthogoriscus mola*) was captured this summer at Ilfracombe. The steamer 'Torrington,' which unloaded at Bideford on September 16th, had on board another Sunfish measuring roughly 4 ft. by 3 ft. 6 in. This fish had followed the vessel into the estuary. When off Greysands it got entangled in the anchor-chain, and was hauled aboard. I caught a Shanny (*Blennius pholis*) of a length of five inches. Numerous young ones in the pools on same date (Oct. 11th), but Montagu's Blenny has completely disappeared, though numerous last year. A gentleman, while prawning at Instow, caught a sleepy Sole of 3 lb. 6 oz.

On Oct. 17th a Porbeagle (*Lamna cornubica*) was captured at Ilfracombe, in the inner harbour. After providing an exciting chase to the fishermen it was landed, and found to be 7 ft. 5 in. in length, with a girth of 3 ft. 7½ in. The men had struck it with a gaff and an oar, but the latter snapped. The fish became disabled, and a noose was slipped round its tail, but it suddenly made a tremendous leap and got free, and swam for the inner harbour. Here it once again got free from a rope placed round the tail, but it eventually ran ashore on the beach. It was then lifted into a handcart, and a crowd quickly gathered to see the creature; when suddenly it opened its mouth quickly, and made a big lurch with its tail. The consequence was that the handcart upset, and the crowd, of course, fled in all directions! This was its last effort. A Whale-thresher (*Alopias vulpes*) was caught at Plymouth this year, and it occurs fairly common on that coast. It is seldom seen on the north coast. One was taken at Ilfracombe many years ago, but has not occurred since. Congers have been in great force, specimens of 51 lb. and 60 lb. having been landed. They rarely get beyond this size with us.

The Horse-Mackerel (*Caranx trachurus*) occurs erratically, generally with any abnormally large shoals of ordinary Mackerel.

This was the case some few years ago, when *Caranx* was picked up commonly on the beach, where they had precipitated themselves.

Parnell's Goby (*Gobius parnelli*) is to be taken in the River Taw; the Spotted Goby (*G. minutus*) is, however, quite the commonest species on the sandy shores at Santon and Woolacombe.

Mr. W. H. Rogers wrote me on Nov. 4th: While fishing in the Taw, at Southmolton Road, for Dace, he caught two Roach (*Leuciscus rutilus*), one weighing 16 oz. and the other 13 oz. The Roach is an exceptionally rare fish in the Taw. I have taken it commonly in the Exeter Canal, and it is to be found at Slapton Ley, in the River Axe, and in the railway ponds at Exeter. The 'Victoria County History of Devon' states that the Perch (*Perca fluviatilis*) is common in Devon, but, as Mr. Rogers can testify, it is unknown in the Taw above Brightley Weir, and I have never heard of its being taken below. It is found in Venn Pool, but has probably been introduced there. Mr. Rogers has taken a few Gudgeon in the station pool at Lapford, and fewer still of the Loach. "Girt Jan Ridd," Blackmore tells us, captured a Loach of a quarter of a pound in Lowmans Water, Exmoor, but I have not succeeded in discovering whether this fish still lives in that river and in the Lyn, as it most assuredly did in former times.

Haddock (*Gadus aeglefinus*) turned up at the beginning of this year in quite large numbers. They have not been known, except as comparatively rare visitants in Bideford Bay, for forty years past. Pollack, Power Cod, and Bib all in round numbers. In working the shore and in the rock-pools I have not yet come across the Fifteen-spined Stickleback (*Gasterosteus spinachia*), though I have taken it at Exmouth, in South Devon.

THE BIRDS OF NORTH KENT: AUTUMN PASSENGERS.

BY THOMAS HEPBURN.

To the observer of bird-life the early autumn has almost as many interests as the early spring. Summer visitors are departing, winter visitors are arriving, and there are also many birds to be seen which are only passers-by on the road from countries north to countries south. You may sometimes read about this time in the daily papers of enormous flights of waders and other birds passing over cities at night, being noticed and identified simply by their whistling notes and cries. And if you are of an imaginative turn of mind you may, perhaps, do as the writer did a short time back—stand in your back garden fancying to distinguish winged travellers innumerable flying far out of sight in the night by a subdued murmuring whistle—to be rudely awakened to the fact that the whistling proceeds from a neighbour's Ducks as they whisper to each other in their nocturnal search for worms.

But the unmistakable whistle of a Curlew flying overhead in the darkness of a September night which lies over the lights of a town is a reminder that these mysterious movements of travel, which waning summer and incipient autumn induce amongst bird-life year after year, have again commenced. Several times during the evening the same plaintive sound is heard, and at a late hour of the night there comes through the open window the subdued call-note and reply of a flock of the same birds resting in a field near the houses for a few hours before making a further move in their journey.

After many years of records from lightships and lighthouses, and of persevering observations carried on at various points along our coast, there is still almost as much mystery as ever, both as to motive and manner. attached to these annual migrations; and the difficulty of solving the mystery is intensified by

the fact that most of the actual movements take place at night. To the man who is an ornithologist, but most of whose time is tied to other matters, it is hardly possible to give that consecutive attention which is required to add further definite knowledge as to the how or the why of the movements of these bird travellers. But if he can find a day to spare during September or October he may at least manage to get a sight of some of the passengers, although he has to draw his bow at a venture, and to depend to a great extent on his good luck as to what species he may see.

The best part of England for observing these passages of birds seems to be the north or north-east coast of Norfolk, evidently because it lies close to the line of flight taken by many of the travellers who, if they meet with a check from adverse winds or any other cause, alight on the land nearest them, where the morning light reveals them to dwellers in the neighbourhood. But there are other parts where to a certain extent, though in a lesser degree, the same thing takes place, and one such spot is that part of the coast of Kent which borders the estuary of the Thames, more especially the easterly and most seaward portion of it. The place generally chosen by the writer is an exposed spit of land near the mouth of the Thames, whence you may look, if you are so inclined, right away to the hazy distances of the German Ocean. At this spot small parties of dallying travellers often stop for a day's rest before continuing their journey to the south. The flat meadow land stretches back to the rounded Kentish uplands. The last ricks of corn are being thatched. In places mysterious looking crops of plants grown for seed are still being harvested. And the newly thatched stacks standing in rows around every homestead appear to tell a tale of a good harvest having been garnered.

On the borders of the upland you have already come across a sign of autumn in a large flock of some two hundred Ringed Plovers (*Ægialitis hiaticola*) gathered on a fallow. By contrast with the brown of the soil the backs of these little birds look almost blue-grey. When they rise and fly their note and the black band across the white breasts distinguish them. The flight of a serried phalanx of small waders is a difficult thing to describe. The eye follows them, held by the momentary expecta-

tion of seeing them turn in the sunlight so as to show their white under sides, so dazzlingly white in the glare that the rest of the bird is unseen, and two hundred flakes of bright silver flash back the rays of the sun. There can be no doubt in your mind, as you watch them, that, whatever philosophers may say to the contrary, these birds are taking conscious pride and pleasure in the varied but accurate evolutions of their flight. These are travellers, for, although the bird nests in the neighbourhood, they are not resident in sufficient numbers to gather into such a large mob as this. It is, however, quite possible that this party may have now arrived at the end of their journey, and may be going to spend the winter months on the happy hunting-grounds of the mud-flats and saltings of the Thames and Medway.

There is more than one route by which you may find your way down to the beach, which is your destination. You choose that which leads you along the edge of a shallow tidal creek, now empty of water. With the embankment as a shelter, you are able to watch a stately and sedate gathering of some ten or a dozen Herons (*Ardea cinerea*), rather an unusually large number of these birds to be assembled together feeding in one spot. They soon sight you, and flap away upon their broad, loosely feathered wings. But there still remain on the ooze and short turf of the bank some less conspicuous birds—a number of Curlews (*Numenius arquata*) and Redshanks (*Totanus calidris*), and a few Peewits (*Vanellus vulgaris*), who, although alert and ready for departure, do not move, and after a moment's quiet return to their feeding. You notice among the Redshanks several waders which seem to differ from them. When you finally disturb the mob these birds separate from the others, and by their alarm-note, their dark upper plumage, and more especially by the striking patch of white tail-coverts, you distinguish them as Green Sandpipers (*Totanus ochropus*), birds that are on their way—possibly from the Arctic Circle—to the warmer skies of Africa.

Moving on to the river-wall, and viewing from its shelter the widening expanse of mud-flat laid bare by the falling tide, the whole of it, from the sandy beach to the distant breakers, is dotted with white flecks, which resolve themselves, through the

glasses, into hundreds of Gulls, invariably with their beaks pointed to the quarter from which a strong boisterous wind is blowing. You recognize them by their size as being chiefly Black-headed Gulls (*Larus ridibundus*), now without their black—or to be more accurate, chocolate-coloured—faces. Amongst them, standing out conspicuously like so many giants, are several Great Black-backed Gulls (*L. marinus*), the black backs showing in striking contrast against the pure white breasts. Probably there are other species amongst these numbers, but they are too far off to be identified, although in several places there are groups of year-old birds in brown plumage of varying shade.

Your observation of the Gulls is suddenly broken by a sharp vibrating whistle, which might be syllabled as “terrett-terrett-terrett,” quickly repeated, and you are just in time to catch sight of and identify some half-dozen Turnstones (*Strepstilas interpres*), flying from the sandy beach and winging their way over the ooze. As they pass along they disturb a small mob of Ringed Plovers, which join them in their hasty flight, and can be identified more by their plaintive whistle than by anything else. Very difficult they are to follow in their movements, the colour of their backs and upper wing surfaces being almost exactly similar to the light brown mud. The Turnstone is a passing visitor. Its plumage is striking, the upper parts of the adult being barred with black and white; but you were able to distinguish from the brown faces of these few birds that they were the young of this year.

And then you are surprised to hear close to you a “chittering” phrase, which carries you back in a moment to the rocky bed of the River Lune in Westmorland, where the same note was last heard—the first phrase of the wild little song uttered by the Sandpiper (*Totanus hypoleucus*), as with a twisting flight it flutters over the broken water and settles on some mossy foam-splashed rock, with a flirt and jerk of its tail, and a final shrill “cheap.” An inconspicuous little bird of brown and white, it may have laid and hatched its four sandy-buff eggs close to the edge of that stream under a bush or tussock of grass, and is now, like its cousin the Turnstone, seeking change in the south.

Further on, in a little shingly bay of the clay cliff of the salting, you disturb a solitary Dotterel (*Eudromias morinellus*) on its way to Palestine or Egypt or North Africa, after having nested on some lonely mountain top in the remote Highlands, or possibly in the Lake District, under all the difficulties that come of too much notoriety. A handsome little Plover is the Dotterel, its head black with white touches, and the ash-brown of its back setting off the warm chestnut colour of its lower breast and flanks.

In a more distant part of the beach you happen upon one of those sights which warm the bird-lover's heart—some hundreds of Lesser Terns (*Sterna minuta*), a score of Common Terns (*S. fluvialis*), a dozen or more Turnstones, and large numbers of Ringed Plovers and Dunlins (*Tringa alpina*), all sitting on a ridge of sand just above the wrack left by the tide. Careful manoeuvring enables you to get a good view with the glasses without disturbing them. It is easy to distinguish the flecked plumage of the Lesser Terns of this year; amongst the Ringed Plovers the pale brown, broken, pectoral band marks out the youngsters of that species; and the Dunlins have still the dark patch on the lower breast which forms their summer decoration. The Turnstones run restlessly along the edge of the *débris* which marks the limit of the tide, and one, with a sidelong turn of its head, tips over a fairly large flat pebble with its beak in its search after insects or Crustacea. But a careless movement causes the whole mixed mob to rise in a cloud, filling the air with cries. The long drawn-out "scree" of the Common Tern, the chattering "skerrek" of the Lesser Tern, the sad, soft whistle of the Ringed Plover, the "purre" of the Dunlin, and the twittering whistle of the Turnstone, form a chorus of sounds which is music to the ears of the man lying half-hidden in the long grass, recalling as it does memories of the wild moorland, of pebble ridges with great waves of the ocean breaking on them, and of many a happy day spent without a care in the freshness and freedom of the open air.

A reply comes ringing from the sky in response to the babel on the beach—a shrill, whistling call, like "tetty-tetty-tetty"—and far overhead in the sky a string of small dots can be distinguished as a dozen birds, which we know from their note to

be Whimbrel (*Numenius phaeopus*); veritable travellers these, not to be turned from their purpose as they drive along on their journey to the summer days beyond the Equator. A shrill echo of their cry is heard close at hand, as a solitary straggler of the species rises from the salt-marsh, and with hurried wing-beat hastens in its attempt to overtake its comrades overhead. A "wisp" of a dozen birds flying swiftly past catches your eye as being in part strangers. Half of them you define quickly as Ringed Plover; the others, about the same size, you see to be a pale grey above, pure white underneath, with white tips to the secondaries, and blackish primaries. As the party settles in a little bay of fine sand it divides into two clusters, and by means of glasses you are able to add to your description of the strangers a black bill, and a shade of darkness around the eyes. They are without doubt Grey Phalaropes (*Phalaropus fulicarius*), already in winter plumage. This sight is already sufficient reward for your day's outing, because it adds a new record to your list of birds observed in the district.

You have had time to partly conceal yourself behind a sloping bank of sand, half overgrown with vegetation, whence you make notes on the disturbed parties of birds coming and going. Turnstones are present in somewhat larger numbers than usual. A flight of various small waders comes over a creek, headed by five or six comparatively large black and white birds, which pass quite close to you, so that you see clearly the piebald plumage and long bright red bill of the Oystercatcher (*Hæmatopus ostralegus*). With a shrill piping whistle they pass out of sight.

During a moment of quiet you find that there are two small birds running over the beach near the water, within ten paces of where you lie. A careless glance would dispose of them as Ringed Plover. But as they are so close, you look at them somewhat critically, and find that there is no continuous band of black across the chest, only small patches on each side. The young Ringed Plover of the first year has markings of somewhat the same description; it does not get a strong black band until the second year. But these birds have not the markings about the head of the young of the Ringed Plover, and their general sandy tinge of plumage determines them as being a pair of Kentish Plovers (*Ægialitis cantiana*), birds whose only remain-

ing English nesting haunt is on the pebbly beaches of the south coast of Kent. Its presence here excites some speculation in your mind as to why it should have worked up north from its usual summer haunts.

The Lesser and Common Tern are fishing all the time along in front of you, and you can notice the brownish tints of the feathers of the young birds of the year of each species. But a scattered party of birds coming towards you over the water with a Tern-like flight arrests your attention at once, because their leader is black, and his followers are black and white. The one is a Black Tern (*Hydrochelidon nigra*) in mature plumage; the followers—although the disposition of the white and black of their plumage and a seeming difference in their style of flight brings the name of Sooty Tern (*Sterna fuliginosa*) to your mind—are probably young Black Terns of the year. The Black Tern used to nest in the Fen country years ago. It is said not to have done so for the last fifty years. Where, then, do these birds come from? For you have seen them before at the same time of the year.

You turn back across the marsh with a sense of satisfaction in the results of your day's outing. As you pass through the hedgerows of the upland the wind has dropped, and the day seems to be merging into a warm summer evening. Yet the clear piping song of a Robin in a cottage-garden is a certain sign that summer has gone.

NOTES AND QUERIES.

 AVES.

Variety of Great Titmouse.—An interesting and beautiful variety of *Parus major* was procured in the neighbourhood of Tetbury on Feb. 6th last, and has been mounted by Mr. Jefferies of that town, at whose house I have been able to examine the specimen. A striking feature about this bird is that where yellow occurs in the typical plumage the coloration is almost normal, although the other markings are but faintly indicated. For example, in the ordinary bird the dark olive-green mantle contrasts distinctly with the much lighter yellow of the breast, but in the variety under notice the back (a faint yellowish green) is paler if anything than the under parts, which have retained their normal sulphur-yellow colour. The tail and wings are almost white, but there is a greyish tint on the former and on the lesser wing-coverts. The normal bluish black of the head and the streak down the centre of the breast are replaced by a delicate mouse-grey. Does the retention of yellow in this bird's plumage indicate that in *P. major* this colour is due to the structure of the feathers and not to a pigment? A Little Owl (*Athene noctua*) has also been sent to Mr. Jefferies. This bird seemingly met with a very peculiar ending, for it was found dead near Fairford on Feb. 20th, in the spout of a shepherd's water-cart. The bird had probably entered the narrow mouth of the spout during the night, and had been unable to escape.—COLLINGWOOD INGRAM (Long Newnton, Tetbury, Gloucestershire).

Glossy Ibis in Aberdeenshire.—During the harvest-time of 1907 an immature example of this species (*Plegadis falcinellus*) was shot in the mill-pond at Watermill, Fraserburgh, by Mr. Adam Brown. It is now in the possession of Dr. Galloway, Aberdeen. Since 1844 this is the fourth recorded occurrence of the species within our county.—GEORGE SIM (52, Castle Street, Aberdeen).

Ptarmigan reported near Trondhjem, Norway.—Probably several correspondents will call attention to what appears to be an obvious case of mistaken identity in the Rev. W. Serle's article on "Birds of Zool. 4th ser. vol. XII., March, 1908.

Graakallen Mountain, Norway" (*ante*, p. 67). From the entire context there can surely be no doubt that the *Lagopus* your correspondent found "abundant all over the mountain" was *L. albus* (Dal Rype), the Willow-Grouse, not *L. mutus* (Fjeld Rype, or Fjeld Skarv), the Ptarmigan. Perhaps the mistake arose from Mr. Serle hearing the birds spoken of by an English-speaking Norwegian as "Ptarmigans," as is so commonly done. Trondhjem can hardly be considered as in "North Norway," being very considerably less than half-way up the country.—ALFRED H. COCKS (Poynetts, Skirmett, near Henley-on-Thames).

Little Auk captured Alive near Yarmouth.—On Dec. 15th, 1907, a small black and white bird was observed by a lad on the beach. He threw a stone at it, and seeing it did not fly ran after it. Another lad joined in the pursuit, and an exciting chase ensued, the bird dodging the lads many times. It was at last captured by the former, who received a sharp nip on the hand with its mandibles. He took it home and placed it in an unused fowl's-run. It was fed on Sprats and pieces of Herring, on which it lived for five days. It was then brought to me, and proved to be a Little Auk (*Mergulus alle*). It was well advanced in its winter plumage, the white line of the occiput being almost completed. These markings I pointed out to Mr. Gurney in February, 1901, and were recorded in his Notes for Norfolk (Zool. 1902, p. 87). Up to the present time, as far as I am aware, this species has not yet been figured in its real winter plumage.—B. DYE (Row 60, Great Yarmouth).

Wildfowl on Blagdon Reservoir, Somerset.—Since writing the notes published in the last number of 'The Zoologist' (*ante*, p. 73) on the wildfowl which I noticed during a short visit to Blagdon Reservoir, I have received an interesting letter from Mr. Donald Carr, the keeper and ranger of the lake, and have also seen a list, drawn up by him, of the birds he has observed on and about the water. Mr. Carr writes that on Jan. 4th of this year the lake was shot over, and the following bag obtained:—Mallard, eleven; Teal, eight; Tufted Duck, sixteen; Pochard, eighteen; Wigeon, six; Golden-eye, four; Smew, one; Scaup Duck, one; Coot, sixty-nine. The letter continues:—"Tufted Duck and Pochard are always in evidence; they visit the lake in large numbers from autumn till spring. The Tufted Duck once nested here in 1906, but owing to an accident the nest was forsaken; the nest contained a clutch of ten eggs. The Teal are more in evidence during December; I have only known of one nest here. Wigeon also visit the lake during the winter in considerable numbers,

but return to the north in spring. The Mallard and Shoveler are resident, and breed in abundance on the meadows around the lake. The Golden-eye visit the lake in considerable numbers, but are more erratic in their movements, as also are the Smew. I have only seen a few pairs of the latter on the lake this season." Mr. Carr has also noticed the White-fronted Goose, Scoter, and Garganey Teal upon the water, and states that the Sheld-Duck has once nested by the reservoir; while among spring and autumn visitors he includes the Common and Black Terns. I consider that these notes contain interesting additions to our knowledge of the county avifauna.—F. L. BLATHWAYT (Lincoln).

PISCES.

Black Sea-Bream at Yarmouth.—On Jan. 23rd my attention was accidentally drawn to a Sea-Bream thrown out with a number of common trawl-fish on a fried-fish shop slab. On pulling it out from the heap I was gratified to see a species hitherto unknown to me, and had no difficulty, on comparing it with the excellent plate in Day's 'British Fishes' (vol. i. p. 26, pl. 9), in deciding its identity as the Black Sea-Bream (*Cantharus lineatus*), or "Old Wife" of Couch. I had seen two or three Sea-Bream the previous day on another fish-slab, but being in a great hurry could not stay to examine them. I have since satisfied myself that they were of the same species; they were of the same size, somewhere about fourteen inches in length. I made further inquiries with a view to finding out where they were taken, and my information, which was hardly satisfactory to myself, seemed to point to their having been caught by the trawl near Cromer Knowle, and as local boats have only just gone out to join the western fleet, I have some reason in suggesting that they were captured off the East Coast. I cannot, however, on such flimsy and unsatisfactory evidence include the species on my Norfolk list. The "Old Wife" has not yet, I believe, been recognized in local waters. The flesh of this species is stated to be soft and poor eating, at its best only in August and September; yet, strangely enough, notwithstanding the local reluctance to experimenting on unusual species, these Sea-Bream were very smartly disposed of, and I considered myself fortunate in obtaining one for the Norwich Museum, whither I dispatched it.—ARTHUR H. PATTERSON (Ibis House, Great Yarmouth).

Lesser Forkbeard at Yarmouth.—My first find from the shrimpers, who, in spite of the inclement season, have started shrimping much earlier than usual, is a very small example of the Lesser Forkbeard

(*Raniceps trifurcus*), measuring barely $2\frac{1}{2}$ in. in length. The little fellow was brought to me by a shrimp-lad, whom I had commissioned to bring some clear sea-water from outside in a big beer-bottle. The boy knew the fish as a "Toad-fish," a by no means inappropriate nickname, for it is a thick-set, blackish, ugly creature. I have before received examples of this species (*cf.* Zool. 1897, p. 554). — ARTHUR H. PATTERSON (Ibis House, Great Yarmouth).

INSECTA.

Introduced Orthoptera.—The Orthoptera and Neuroptera are the least numerous of the principal orders of insects, but while the latter are fairly well represented in Britain, the poverty of our orthopterous fauna is quite astounding. In 1882 Brunner von Wattenwyl published his *Prodromus* of European Orthoptera, in which he enumerated four hundred and sixty-three species; but Mr. Malcolm Burr, in his useful little book on British Orthoptera, enumerates only fifty-three, of which at least seventeen must be regarded as either naturalized species or merely casual visitors, thus reducing the total of our actually indigenous species to less than forty. However, Orthoptera are hardy creatures, not always very particular about their food, and are easily carried from one country to another with merchandise, and consequently may be carried to and even naturalised in countries very distant from their original locality. Not only South European, but African, Oriental, and American species are frequently found in England, sometimes in houses in the heart of London, and sometimes in gardens, especially Kew Gardens. This applies specially to *Blattidæ* (Cockroaches), of which we have probably only three indigenous species, though the German, Oriental, American, and Australian Cockroach are all now thoroughly naturalized, and the Madeiran, Surinam, and Drummer Cockroaches are occasionally met with in single specimens. Two of the prettiest of these casual visitors are the bright green species of the genus *Panchlora*, which are often brought over among bananas, and a black species with yellow markings (*Dorylæa rhombifolia*), common in Africa and the East Indies, which has lately been taken in one or two places in London. Other interesting imported species are *Acridium ægyptium*, a very large Locust with transparent hind wings, marked with a broad curved black band, which is often brought with fruits and vegetables from the shores of the Mediterranean; a very curious brown Japanese Grasshopper, resembling a Cricket, with legs with very long

spurs, and a long spine sticking out of each knee, and the hind wings banded with pale yellow (this was found in a house at Chelsea); and *Copiophora brevicornis*, a green insect not unlike our common Great Green Grasshopper, but with a long pointed snout like a triangular spear-head, and a long straight ovipositor twice as long as the body. It is a South American insect, but is sometimes found in England in botanic gardens.—W. F. KIRBY (British Museum).

NOTICES OF NEW BOOKS.

A Monograph of the British Annelids. Polychæta (Vol. II. pt. 1).
Nephtydidæ to Syllidæ. By WILLIAM CARMICHAEL MCINTOSH,
M.D. Edin., &c. Ray Society. 1908.

THIS beautiful monograph is a worthy example of the good work of Prof. McIntosh, and may be accepted as the type of what the Ray Society can and do publish. British Annelids are again enumerated and described by one who knows his subject and loves the work, and British zoology becomes a larger subject to many who scarcely realize, as they may from the gorgeous plates in this volume, that, in the words of the author, not a few—for example, in the *Phyllodocidæ*, *Hesionidæ*, and *Syllidæ*—are amongst the most beautifully ornamented invertebrates; “indeed, many vie with the gaudy tints of butterflies and birds, or the burnished splendour of beetles.”

As regards classification, Prof. McIntosh is one who thinks for himself, and does not consider himself bound to follow the classificatory propositions of others. As he writes:—“The Polychæta, indeed, do not lend themselves readily to the systematist, and it is safer at present to place the families in series according to their natural and structural relationships, reserving further consideration of the subject for the summary.” How many a monographer of other animals has acquired this experience! He often commences with a classification generally not his own, and finds it wither and perish as his work progresses; an alternative scheme is then too late, and he must struggle on

in taxonomic shackles which he has not had the temerity to refuse to wear. It is often only when we have finished our monographic work that the dawn of a workable classificatory system arises.

The descriptions are ample, the synonymy extensive, and the distribution of the species fully recorded; the illustrations comprise eight coloured and fourteen uncoloured plates, with occasional figures in the text. We have thus a pleasant duty in bringing this publication to the attention of all shore naturalists, and we do so with a conviction that the result will soon appear in bionomical notes on the Polycheta in the pages of 'The Zoologist.'

The Work of John Samuel Budgett, Balfour Student of the University of Cambridge. Edited by J. GRAHAM KERR. Cambridge University Press.

THE memory of John Samuel Budgett is one which Cambridge hath delighted to honour, and rightly so. A life of promise prematurely closed, a character which endeared its owner to many friends, combined with a love of real zoology which carried him more than once to the Tropics and eventually cost him his life, are features of a personality which could not fail to leave its mark. His principal achievement was the discovery of the life-history of *Polypterus senegalus*. As his biographer, Mr. A. E. Shipley, remarks:—"After years of patience, after three unsuccessful journeys into the heart of Africa, he had at last succeeded where all others had failed, and as he watched under the microscope the gradual unfolding of the ovum, the formation of the layers, the building up of the organs, he must have experienced a joy peculiar to men of science, and experienced by but few of them." Dr. Boulenger's testimony summarizes the whole business:—"Collectors of zoological specimens there are in plenty, but they are seldom in a position to make observations on the breeding habits of the lower vertebrates. Several attempts had been made with the object of procuring the developmental stages of the African fishes *Polypterus* and *Protopterus*, but in vain. Budgett determined not to

rest until he had attained the long-sought prize ; he succeeded, but for this success he paid with his life."

The volume contains an elaborate memoir by Mr. J. Graham Kerr on "The Development of *Polypterus senegalus*," and another by Mr. Richard Assheton on "The Development of *Gymnarchus niloticus* ; Mr. Edward T. Browne writes on "The Freshwater Medusa *Limnocyclus tanganica* discovered by Budgett in the River Niger," and Mr. Edward J. Bles on "Anuran Development." The various scientific papers of the deceased biologist are also reprinted, and a beautifully illustrated volume constitutes both a personal testimonial and a no mean contribution to biological science.

A Guide to the Study of Australian Butterflies. By W. J.

RAINBOW, F.L.S., &c. T. C. Lothian, Melbourne.

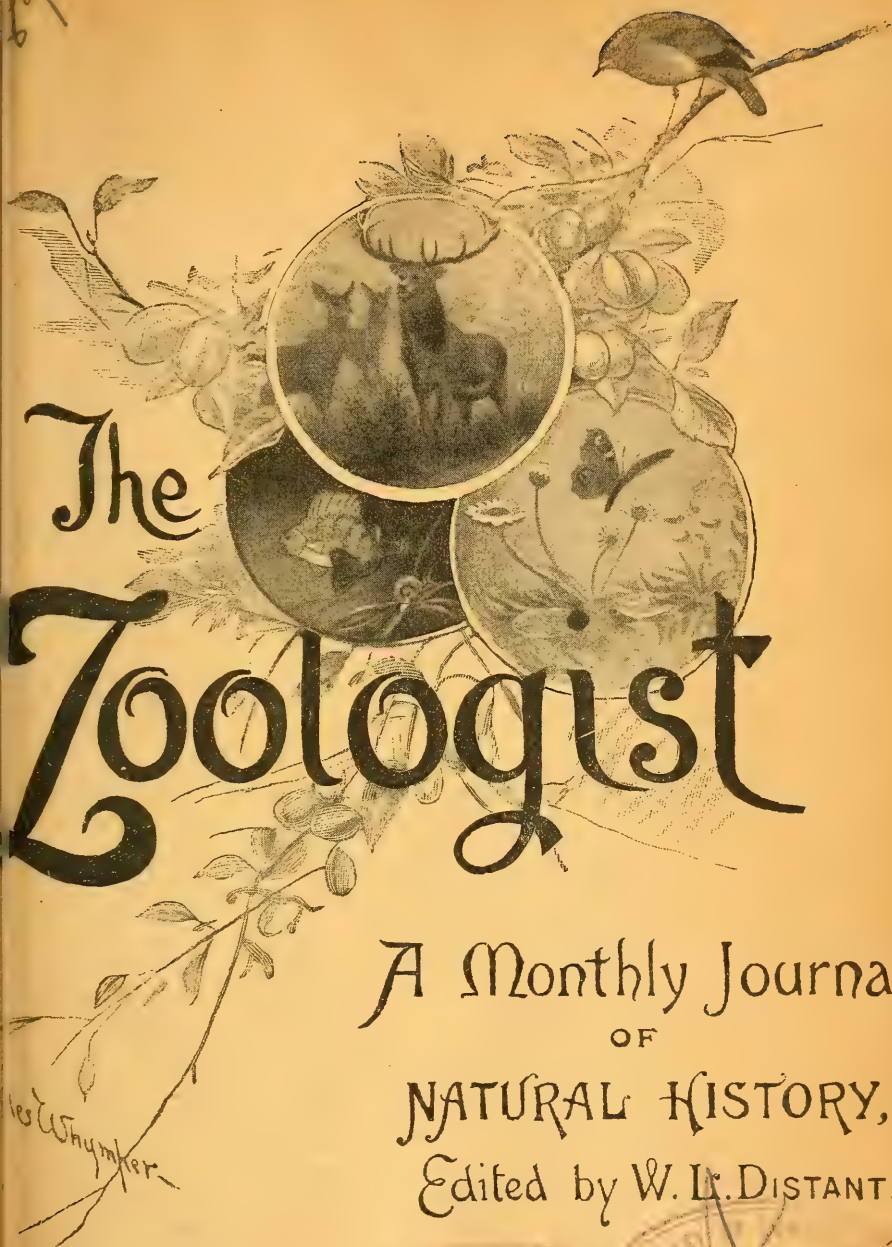
THIS book is an introduction to a knowledge of the Australian Rhopalocera, and is confined to those species "of which something is known of their life-history." It is therefore biological and bionomical so far as it goes, and "no previous knowledge on the part of the reader has been presupposed." As an introduction to a most interesting lepidopterous fauna, Mr. Rainbow has achieved success—he has created an interest in these butterflies, and in giving the life-histories of a number of species he has disclosed the method to be pursued in investigating those of the many species untouched in his volume. It is thus an incitement for future work beyond the mere accumulation and naming of species for cabinet adornment. Typical species of the principal families and subfamilies are well figured, and, what is more, many ova, larvæ, and pupæ.

As regards the terminology used, some criticism is allowable. Thus Mr. Rainbow prefers the generic name *Danaus* to that of *Danais*, but still retains the name *Danainæ* for the subfamily. As this is founded on *Danais*, one change must necessitate a constructive change in the other. Again in chap. v., devoted to the "Blues and Coppers," he has substituted the name *Lycinidæ* for *Lycænidæ*, but in previous pages and on five occasions he has referred to the family as *Lycænidæ*, a course likely to pro-

duce confusion in the mind of an inexperienced lepidopterist. We think also that the definitions of *protective resemblance* and *mimicry* are insufficiently illuminative. The first Mr. Rainbow considers as simply meaning "that an animal may resemble in colour or tint the bark or leaf on which it rests," and that this process is an *unconscious* one on the part of an insect; while by mimicry he understands "that an animal which in itself is either harmless or edible has *assumed* a close resemblance either in form or colour to those commonly regarded with fear or repugnance." We would rather regard the first as the least unconscious, and as disclosing an effort for concealment; while the second process is less to be realized by the term *assumed* than by the unconscious action of natural selection.

But these suggestions in no way depreciate the value of an excellent introduction to a knowledge of the Butterflies of Australia.

THE following have been elected by the Council of the British Association to be Presidents of Sections at the meeting of the Association to be held in Dublin in September next under the general presidency of Mr. FRANCIS DARWIN, F.R.S.:—Section C. (Geology): Prof. J. JOLY, F.R.S., Professor of Geology and Mineralogy in the University of Dublin. Section D. (Zoology): Dr. S. F. HARMER, Superintendent of the University Museum of Zoology, Cambridge. Section H. (Anthropology): Prof. W. RIDGEWAY, Professor of Archæology in Cambridge University.



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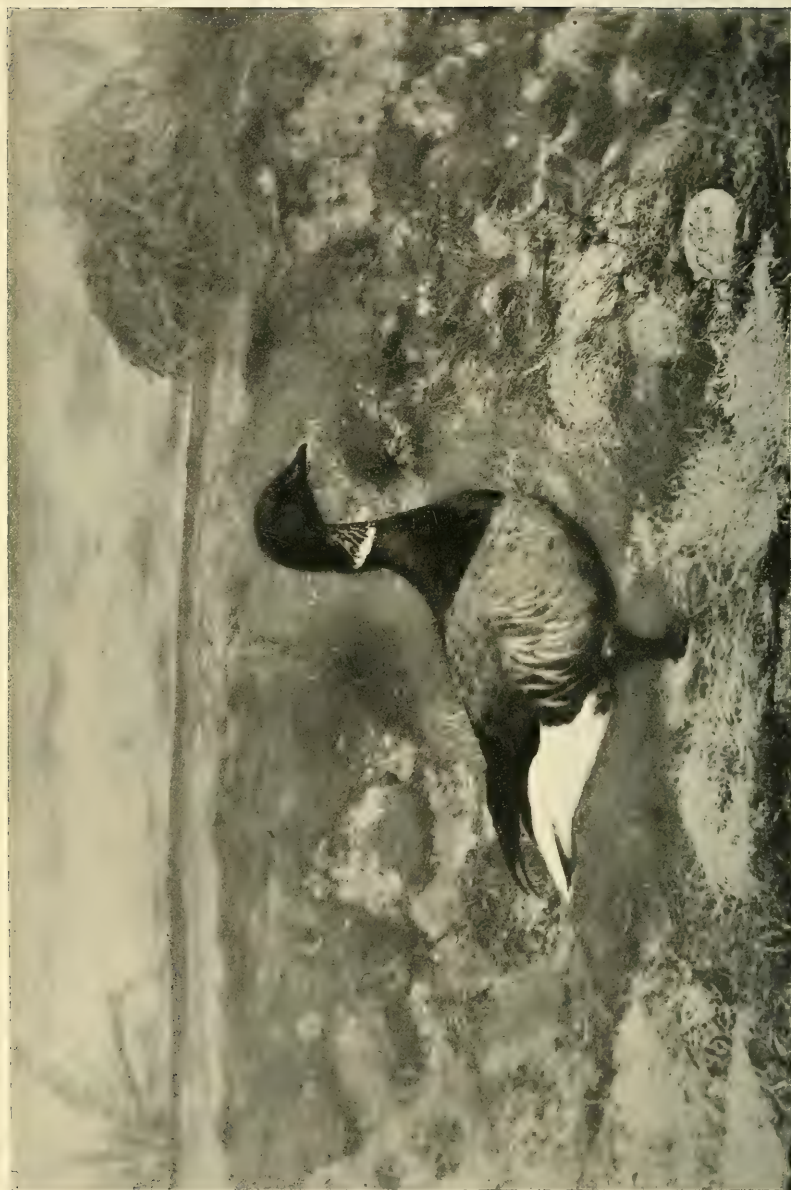
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West, Newman proc.

AMERICAN BLACK BRANT (*Bernicla nigricans*).

THE ZOOLOGIST

No. 802.—*April, 1908.*

ORNITHOLOGICAL REPORT FOR NORFOLK (1907).

BY J. H. GURNEY, F.Z.S.

(PLATE I.)

THE year 1907 has added the Desert Wheatear to the Norfolk list, and also, through the discrimination of Mr. F. Coburn, the Black Brent, though the latter had really been obtained once before in Norfolk, bringing up our list to three hundred and seventeen; but what attracted most attention were the luminous Barn-Owls, which, received at first with incredulity, were soon proved to be an attested reality, and they are flying about in the county still. That luminous Barn-Owls have been seen before in the same part of Norfolk is certain, and therefore there need not have been so much scepticism about them. We have it on the best authority—namely, from the man himself—that some years ago Frederick Rolfe, a gamekeeper now retired, saw what could have been nothing else when stopping Fox-earths at West Bilney. A few nights afterwards he saw the same shining bird again, subsequently shot it, and found that it was a Barn-Owl. He has a perfect recollection of all the circumstances, and describes the Owl as emitting a very bright light when near him, and that it even continued to give out a slight glow for some hours after it was dead. Other stories are also told of moving lights at night, now believed to have been birds, and there can be little

doubt that they were Barn-Owls, though that was not suspected at the time. As long ago as 1866 Mr. J. A. Harvie-Brown met with an instance of it in the Barn-Owl in Cambridgeshire, which was never recorded, and other cases might be cited which for various reasons did not find their way into print.

With regard to what causes the luminosity, the general idea in Norfolk is to ascribe it to the luminous touchwood which is occasionally to be seen in trees, more particularly in the ash. At a meeting of the Norwich Naturalists' Society, when the luminosity of Owls was made the subject of discussion, Mr. S. H. Long stated that this luminous touchwood was due to the presence of certain mycelium forming Fungi, which is also what Mr. M. C. Cooke says. In his 'Introduction to the Study of Fungi,' p. 89, Mr. M. C. Cooke says:—"Several Agarics have this property, of which the largest number for any locality have been met with in Australia. All of them are species found growing upon dead wood, and all have white spores. Nearly the same story is related of all of them—to the effect that they emit a light sufficiently powerful to enable the time on a watch to be seen by it." In this way bacteria may have been imparted to the feathers of the Owls by contact, supposing that they inhabited a luminous hollow in some tree.

Another theory has been put forward by Mr. W. P. Pyecraft, *viz.* that this luminosity may possibly be really due to some species of feather fungus new to science, for, he adds, it is known that feather fungi do exist, and he cites the case of a Goose thus affected. It would be a great pity to shoot these Owls, I think, but if their lair could be discovered we should at any rate see if it was a luminous hole, which would advance us one step in the inquiry.

The Vernal and Autumnal Migrations.—Nothing uncommon characterized the vernal migration, except it be worth mentioning that there was rather a late passage of Fieldfares. The Sociable Plovers and other rare birds which showed themselves in the county of Kent sent no contingent, as far as we know, to Norfolk or Suffolk. Neither was the autumnal migration marked by the rushes which sometimes characterize that season of the year. Except for an inrush of Rooks on the Suffolk coast on Oct. 26th, there were no real congregations of *Corvidæ* seen, and nothing

stamps the character of October and November more than the arrival of the *Corvidæ* on the East Coast. It is evident from the observations of Mr. Boyes, of Beverley, that the bulk of the Fieldfares, Redwings, Blackbirds, Bramblings, Tree-Sparrows, &c., made land further north.* There certainly was a passage of small birds of considerable strength registered by that experienced observer Mr. H. N. Pashley on the night of Oct. 9th—fully accounted for by the south-east gale—but this movement did not synchronise with the great flight in the North of Denmark on the 11th.

As usual, my best thanks are due to many correspondents for their co-operation, without which this Annual Report could hardly be carried on, and especially to the Rev. M. C. Bird, of Brunstead, and Mr. H. N. Pashley.

The rainfall for the year was 25·13 in.

JANUARY.

1st.—When last year's Report left off, the cold weather, which for a period had been almost Siberian in its intensity, was beginning to break up. Nevertheless, the unfortunate Coots, whose sufferings were described in your pages last year (Zool. 1907, pp. 85, 138), continued to have a bad time of it on our great tidal Broad at Breydon. Nor were they much better off on the fresh-water Broads now frozen over, and the Rev. M. C. Bird writes of a good many being skated down on the ice at Hickling, one man getting thirty as his share.

2nd.—A Goosander at Eye, and on the 4th Mr. W. Lowne received one from Buckenham, and another from Somerleyton; on the 6th there was one at Hickling Broad (Rev. M. C. Bird), and the next day Mr. Lowne had as many as four from Brundall, shot on the Yare; and about the same time one or two were reported to Mr. H. N. Pashley. Some of the above were good males, I believe. At the same time several Goosanders visited Yorkshire.

15th.—The Wash "deeps" and their attendant shoals have always been a resort of Brent Geese, though not so abundant on any part of our coast as formerly. On the 15th, I learn from Mr. F. Coburn, of Birmingham, that an example of the Pacific

* See the 'Field,' Nov. 17th, 1907.

Brent—or Black Brent, as it is termed in American works (*Bernicla nigricans*)—was shot by a wildfowler named Richardson, who devotes his attentions especially to these fowl. Mr. Coburn, who has paid particular attention to Geese, after observing that the present example is an adult female, and that an adult male of the same species (*B. nigricans*) had also been shot by the same wildfowler on Feb. 14th, 1902, near Lynn, continues:—"On the Pacific side of America they never see anything but the black race of the Brent Goose, and its plumage is always of the same brownish black colour on the under parts both summer and winter. . . . In addition to the larger amount and different distribution of white on the neck, I have found another character which is constant; this is that the central under tail-coverts project considerably over the end of the tail—in some cases nearly one inch—so that when the tail is closed the end appears to be white instead of black." This feature of the tail-coverts is well shown in the photograph which Mr. Coburn has obliged me with, taken from the Lynn bird of 1902, which is rather a better example than the one sent him in 1907, and it also shows the white neck marks almost meeting in front—a very important character. The validity of *Bernicla nigricans*, which has also been recently admitted into the Italian avifauna (Atti Soc. It. Sc. Nat. xlv.), is now fully recognized. Mr. Coburn observes that it must not be confused with the dark-bellied examples of *B. brenta* which have been obtained in Norfolk on different occasions, and which are considered by Mr. Coburn to be all males, a sexual difference which my limited observations confirm. Dresser, who gives specific rank to *B. nigricans* in his 'Manual of Palearctic Birds,' defines its habitat as Western North America, from the high north in summer to Lower California in winter, and east coasts of Asia from Kamchatka to Japan.

21st.—Sheld-Duck seen at Fritton by Mr. Buxton; very unusual on that lake.

27th.—More snow and hard frost; thermometer down to ten degrees. Two Smews on Breydon yesterday (B. Dye).

29th.—A drake Shoveler seen on the river at Eaton by Mr. Knight, its presence no doubt due to the return of the frost. A number of Tufted Ducks on the river and meadows at Postwick,

several of which† were shot. Subsequently Mr. Barclay and myself saw about a hundred Tufted Ducks† on Hoveton Broad, where on that wide sheet of water they were safe.

30th.—A Smew on Breydon Broad (A. Patterson), and shortly afterwards one on Hickling (M. C. Bird).

31st.—A Great Crested Grebe on the River Yare, at Eaton—not shot at, I am glad to say (R. Moore); I never heard of one there before.

FEBRUARY.

3rd.—A luminous Barn-Owl, emitting such brilliancy as to resemble a distant carriage-lamp, was seen at Twyford by Mr. R. J. Purdy and other persons. It was, however, not until December that the existence of a pair of these luminous birds attracted general notice, attention being first directed to this phenomenon by Sir T. Digby Pigott in 'The Times.'

MARCH.

20th.—A Black Redstart caught by Mr. Wyrley Birch in a glass porch at West Bilney Lodge, into which it may have been tempted to enter in search of flies.

21st.—A Red-legged Partridge picked up by George Jary, watcher to the Bird Protection Society, in Breydon Channel, after a gale from N.W., and a few days afterwards another caught in the heart of Yarmouth (Patterson), a repetition of what happened in April, 1905.

28th.—An early Coot's nest with five eggs (Bird).

APRIL.

14th.—Thirteen Little Grebes counted by Mr. L. C. Farman at Haddiscoe, where they breed—perhaps a company just arrived. It is a bird of double passage, but it is not likely that those which breed with us are the same individuals which we have on our streams in winter. Rose Pastor at Toftrees (D. U.).

21st.—S.W. The 21st saw the annual return of the Spoon-bill to Breydon Broad, where it was carefully watched by G. Jary until the 24th, when it departed. Last year it was first seen on the 28th. It is generally in the latter part of the month that the watcher expects to see it.

28th.—Mr. Farman saw a pair of Garganey Teal on the Waveney—summer migrants, probably just arrived.

MAY.

3rd.—One of the unopinioned Gannets on my ponds escaped in a high wind, and as all inquiries failed to learn its whereabouts, there can be little doubt that it succeeded in reaching the sea.

4th.—Hoopoe seen at Lammas by Mr. Walter Rye.

8th.—S.W. A handsome Pied Flycatcher† in the garden at Northrepps, and another Spoonbill on Breydon Broad, where on the following day it was seen by Mr. Jary to have been joined by a mate.

11th.—One of the Spoonbills seen by Mr. Farman as high up the River Waveney as Haddiscoe, where fortunately no one was tempted to break the law by shooting it. Sketches of it in various attitudes were taken by Mr. Patterson, and exhibited at a meeting of the Norwich Naturalists' Society.

13th.—My nephew tells me of there again being an Oystercatcher's nest with four eggs at Blakeney, the site chosen being within forty yards of the nest examined last year by the Duchess of Bedford, and no doubt the property of the same pair of birds. In the absence of the watcher the eggs were taken (D.U.), but the depredator was found out, prosecuted, and fined. The photograph of the eggs had been done by Mr. Edward Corder before this happened, but I doubt their being in the position in which the Oystercatcher left them. (See illustration on opposite page.)

15th.—A large "trip" of thirty Dotterel on the grass-lands indicated to Mr. Pashley the usual passage of these handsome spring Plovers, and a day or two afterwards Mr. Dack saw another on Kelling Heath, besides which a "trip" of ten were seen near Yarmouth (E. Saunders).

25th.—A Gannet taken in a Mackerel-net at sea, and brought by the captor to Mr. Patterson, is in the adult plumage except for the two middle tail-feathers, which are black, and there is also a little black on the posterior secondaries. Eye white, and round the eye the usual circle of blue skin. Placed on my pond this bird remained there in excellent health for seven months, and then died from a slightly salt Herring given when no fresh fish was obtainable.

JUNE.

4th.—W. A Spoonbill on Breydon Broad which had no crest was joined on the 6th by another, and the pair, which both Mr. Patterson and Mr. Jary described as very young ones, remained until the 18th. If they were birds of this summer they were uncommonly early ones.

9th.—*Utility of the Barn-Owl.*—Climbed to a Barn-Owl's nest in a pollard-oak; contents of the nest five young Owls (as usual of very different ages), two eggs (but these may have been rotten ones), a young rat, three or four fresh mice, and some



OYSTERCATCHER'S NEST AND EGGS.

pellets. No luminosity visible in the hollow, nor any game or feathers of any birds. What a pity it is that so many good gamekeepers will not allow themselves to be convinced by their own senses that the Barn-Owl is a friend! If this bird caught its food by day instead of by night they would have ocular demonstration of its utility. I have known a single keeper to destroy fourteen of these useful birds under the impression that he was doing his master a good service! One of my Barn-Owl's trees, a noble elm, was blown down this winter, giving me another

good opportunity for observations. In addition to the pellets in a tub put up for Owls, its hollow trunk contained a congeries of remains which, when I saw them, I directed my man to collect and soak in water, that we might have still more evidence wherewith to refute the gamekeepers. After throwing away the fur and all the lesser bones there remained over one hundred and twenty skulls, which consisted of eighty-six Long- and Short-tailed Field-Mice, twenty-six Rats (some of them very small), nineteen Shrew-Mice, and the skulls of two birds which appeared to belong to a Sparrow and a very small chicken. After they were thrown away I regretted I had not had them all photographed spread out on a board.

13th.—A Reeve's nest with four eggs on the Broads, of which Miss Turner has already published an excellent account in 'British Birds,' p. 66.

21st.—N.W. A very good adult Spoonbill, probably a new arrival, on Breydon Broad, but, though protected, it only stayed two days (Jary).

23rd.—Caught an old hen Hawfinch and four young ones under our pea-net, implying a nest not far off, which may have been the case, as we also saw two here in April, and later in June three more came.

25th.—Hawfinches taking peas badly at Westwick (M. C. Bird). A Grasshopper-Warbler's nest with eggs near Fakenham (Q. E. Gurney).

27th.—A fairly good number of Bearded Tits reported to be breeding on the Broads (Miss Turner). A young Redshank† hatched in an incubator by Mr. H. Wormald is now eight weeks old.

JULY.

6th.—A Quail's nest with nine eggs† in it mown over by hay-makers at Ingham (R. Gurney). At Haddiscoe a pair of Blackbirds developed a mania for nest-building, completing, I am informed by Mr. L. C. Farman, twelve nests but laying no eggs. One nest which they built on the top of a paled gate was taken possession of by a pair of Pied Wagtails. The Blackbirds finished off their operations with a twin nest of two cups joined together, after which the female broke her wing against a wire linen-line (Farman). There was not a single Heron's nest at

Earlham, and no Black-headed Gulls' nests at Hoveton Broad this summer, as I learn from Mr. Barclay they have moved to Alderfen, more to their liking, and a few miles off.

16th.—Chiffchaff in full song still at Twyford, and Chiffchaffs and Willow-Warblers were heard there at intervals throughout the autumn (C. Hamond).

AUGUST.

5th.—W. A Spoonbill on Breydon (Jary), but it had gone next day, and no more were seen this year.

8th.—Young Cuckoo being fed by Willow-Warblers at Brunstead (Bird). Both ours at Keswick were this year in Wagtails' nests,† one nestling being about five days in advance of the other.

19th.—Gadwall (immature) at Potter Heigham (W. Lowne), not likely to have been bred there.

26th.—An Osprey seen at Smallburgh (M. Bird), and two days afterwards the same or another seen on the Broads by Miss Turner.

SEPTEMBER.

5th.—S.W. 4. It was not until September that the coast migration proper set in. I was in Scotland, but several rare birds seem to have been passing. As stated by Dr. F. G. Penrose in 'British Birds,' a Yellow-breasted Bunting† was shot near Wells by a son of one of the Earl of Leicester's gamewatchers; the wind the preceding evening had been S. 4, but in the morning N.W. 3. Russia is the country it would be expected to have come from, but it goes as far as Syria, according to authors. I am indebted to Mr. A. Napier for a sight of this Bunting, which is to be added to Lord Leicester's collection.

11th.—N.E. 2. Mr. E. C. Arnold, who was staying on the coast, saw a Red-breasted Flycatcher, but adds that it was not identified with certainty. It is probably an annual visitor to our coast, though overlooked until of late years.

18th.—S.W. variable to N.E., 1. Seven Grey Geese seen by Mr. Arnold in Blakeney Estuary, where a day or two afterwards I heard of a Long-tailed Duck, a female Eider Duck, and two young Gannets.

26th.—Ring-Ouzel at Northrepps, where my gardener says it remained three days close to a large elder-bush, which I believe

they visit for the berries every year (*cf.* Zool. 1903, p. 134). Several others seen along our coast about this time, as well as by Mr. Caton Haigh in Lincolnshire.

OCTOBER.

9th.—S.E. 4 (rising in the evening). October was on the whole a fine month, with winds light in force except for the gale on the 9th and 10th. It must have been impelled by this wind that a young Purple Heron† crossed the sea, and, attracted by the lights of Lowestoft, settled in the populous suburb of Kirkley, where it was made captive by a tram-conductor, and taken to the house of Mr. H. Bunn, one of whose customers kept it alive for six weeks, and it was then killed and stuffed. It is in the red plumage which led to its being mistaken at first for a Bittern.

10th.—S.S.E. 6. News was brought to Mr. Pashley by those who had been down to the shore that the bushes of scrubby saltwort along the coast were full of the usual small migrants, and at least one observer identified a Black Redstart. Perhaps there was a movement of Black Redstarts on the Continent, for between this date and the 26th Mr. Pashley knew for certain of eight of these birds coming to his portion of the coast, and Mr. Lowne, of Yarmouth, had another, which indicates rather a strong movement for the East Coast. On the evening of the 9th the wind was S.E. 6, which it continued to be throughout the 10th, rising to a high gale, force 7, in the evening. The first Bluethroat was seen yesterday.

11th.—[On the night of the 11th a great migratory movement must have been in progress on the north coast of Denmark, no fewer than a thousand birds being taken at the Skaw Lighthouse (*cf.* 'Field' of Nov. 2nd, 1907). No list of the species has yet been published, but Mr. Winge, of Copenhagen, writes me that there was neither a Black Redstart nor a Richard's Pipit among them. The wind at the Skaw was W.S.W. 4, but in the morning it had been E.]

12th.—During the recent S.E. gale a little flock of Richard's Pipits would seem to have been blown to the coast of Norfolk. On the 12th, the day that the first was seen, the Rev. M. C. Bird speaks of "trips" of Larks passing, and both they and the

Pipits may have come from the north of Denmark, and been part of the passage which was observed there, but in that case they were not flying with the wind. The first one† was brought to Mr. Pashley's house on the 12th (S.W. 4), and another† during the high wind on the 14th (S. 6); these two were ascertained by Mr. Pashley to be male and female, and I should say one was in active moult, the other through it. On Nov. 15th, wind W. 2, another was identified in the same locality on or near the shore, and on the 21st another [on which day one was also taken in Co. Dublin (*ante*, p. 32), the first for Ireland]. Their loud call-note in the air sometimes betrays their presence, even when the bird itself is still far away, as Gätke remarks, and the same has been observed in England. In Heligoland fifty can be sometimes seen in a day ('Birds of Heligoland,' p. 348).

17th.—[*Eagle at Sea*.—Capt. Allenby informs me that a Spotted Eagle, apparently dazzled by the lights on board ship, alighted on the deck of one of the Cruiser Squadron in lat. 54° N. long. 3° E., the wind being S., force 3, and being captured was subsequently forwarded to the Zoological Gardens, where its identity as *Aquila maculata* was ascertained. Capt. Allenby adds that a large number of other migratory birds were seen in the North Sea about that time, the distance from the coast of Norfolk being about one hundred and forty miles. It would have been interesting to have ascertained what they were. Up to 1895 the Spotted Eagle had been obtained in Heligoland twice ('Birds of Heligoland,' p. 179), but it has never paid us a visit nearer than Southwold.]

19th.—Mr. Pashley hears that there are a number of Gannets off the coast, both young and old; no piebald ones have been noticed. Pomatorhine Skua brought in by a "lugger" (Patterson).

22nd.—S.W. 3. A Richard's Pipit taken by a birdcatcher on Yarmouth denes, being taken to Mr. Lowne, at once began to feed on mealworms offered to it. Mr. Lowne describes it as being not yet through its moult, stumps of feathers showing on the sides and head.

23rd.—S.W. 1. Many strings of Gulls going west at Overstrand. Two Velvet Scoters in Blakeney Estuary.

24th.—Weighed a young Gannet at Mr. Pashley's house

(5½ lb.), but this is a good deal less than two I weighed last year.

29th.—S.E. 5. A Yellow-browed Warbler shot at Cley (H. Pashley); the other Norfolk example was obtained on Oct. 1st, 1894. The following day (S.S.E. 4) a Red-breasted Flycatcher was identified, and a Spotted Crake occurred at Wiveton (Pashley), not a common bird at any time.

31st.—S.W. 2. The Desert-Wheatear is a bird which we have been expecting for some time, but it does not appear to have been identified in Norfolk or Suffolk until to-day, when I am informed of one being shot near the sea. This is a large example,† a male bird, and apparently an old one from its plumage, measuring, after it was stuffed, 6·3 in. from tip of tail to tip of beak; throat richly mottled with black, on the back a delicate buff tint. This is only the second occurrence of the Desert-Wheatear in England. The first one, obtained in Yorkshire in October, 1885, was a young female, not so large a bird as the present example; it has appeared oftener in Scotland and Heligoland. On the same day a male Fire-crested Wren, which had quite lost its way, was caught in the town of Yarmouth and taken to Mr. J. E. Knights, to whom I am indebted for a painting of it; so possibly the two birds came over in company. The wind the day before had been S. 4, from which quarter it had been blowing strong since the 28th.

NOVEMBER.

3rd.—A Great Grey Shrike at Yarmouth (Patterson), and about this time (D. U.) the same or another was seen at Westacre by Mr. Birkbeck.

7th.—A Gadwall shot on Hoveton Broad by Mr. Barclay, and the following month another on Hickling Broad (Bird). Their presence on the eastern side of the county was until recently quite exceptional.

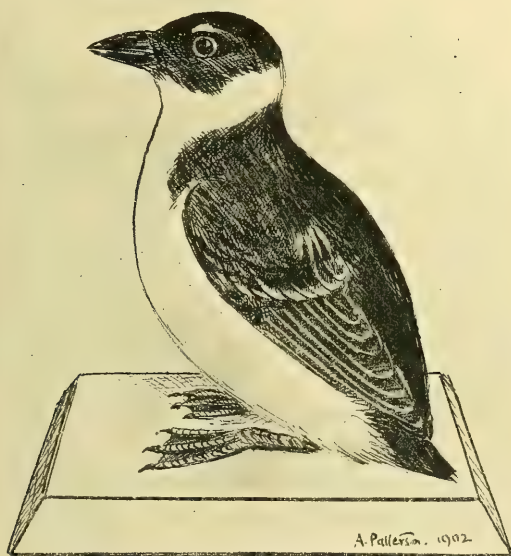
14th.—Ninety-six Scoter Ducks shot to wooden decoys off Hunstanton ('Eastern Daily Press'), where this form of sport is in great request, but such a large bag is unusual. The following day seventy-eight more were killed.

16th.—Mr. Farman saw a Waxwing—the only one, I think,

reported this year—feeding on haws at Haddiscoe Dam. Last year only one was noted, and I think one the year before.

17th. — Over five hundred Pochards on Hickling Broad (Bird).

19th.—That Barn-Owls are erratic in their time of breeding is well known, and therefore it was not surprising to find that an old elm-tree at Keswick contained young ones. Not many weeks after they had flown the bough snapped off, when it was found to be hollow for fifteen feet, the aperture being packed from end



LITTLE AUK (*Mergulus alle*).

to end with old Jackdaws' and Owls' nests. It was also during this month (D.V.) that a young Barn-Owl was brought to Mr. Gunn, with a message that the hole it came from contained three dead nestlings.

22nd.—A White-fronted Goose shot at East Ruston (M. Bird), and two days before one was brought down at Morston.

26th.—A late Whimbrel still at Wells (P. Hamond).

28th.—S.W. 4. A Nutcracker seen at Gunton, near Lowestoft,

and again on the 30th, when it was very exhausted (E. Fowler), and probably did not survive very long.

DECEMBER.

1st.—*The Luminous Owl*.—The luminous Barn-Owl, which, except for one appearance to Mr. Spencer in October, had not been seen since February, was again observed by Mr. R. J. Purdy, his son, and other persons, shining brightly in the same locality as before.

15th.—Mr. Dye, in recording a Little Auk (*ante*, p. 114), expresses an opinion that there is no figure of this bird which shows a complete white occipital line. I have not seen his bird, but I give a drawing by Mr. Patterson of a Little Auk taken at Yarmouth six years ago, which shows this character very strongly. (See illustration on p. 133.)

22nd.—Again the luminous Owl showed itself to Mr. Purdy, and between this date and the 29th it was seen by several people, and by many others subsequently. On the 29th its luminosity appears to have been at its maximum, the branches of trees being even lighted up as it flew amongst them. It was presently joined by a companion, also luminous, but not so bright as its mate, and I am assured by Mr. Purdy that on different occasions one or other of them was seen in six contiguous parishes. The nightly rounds of a Barn-Owl, which are often much the same in line of flight, would not be expected to extend further than that under any circumstances. The light is described by those who saw it best as pale yellow with a reddish tinge; at its brightest it was about as brilliant as the light of a bicycle lamp some three or four hundred yards away, and that was what Mr. Purdy at first mistook it for. Anyhow, the light does not seem to have had the effect of giving warning to Rats and Mice, for Mr. Hamond's bailiff saw it drop on one, and heard the little animal shriek. On one occasion the shining bird was quietly seated on a gate, and another time on the ground, having probably just dropped in pursuit of a Mouse. Those who saw it best agree that it was much brighter when coming towards the observer, and especially when rising in the air, but so much did the light pale as it flew away in the contrary direction that it is certain that little, if any, of the glow proceeded

from the back of the bird. I tried my best, in Mr. Hamond's company, to see this ornithological phenomenon, but with no success; though we were rewarded by a gentleman resident in the parish showing us a luminous tree. It was the stump of an ash which, when he found it, had a phosphorescent superficies of several feet on the decayed side, but the glow was not very bright, and there certainly was no hole which could have held an Owl.

25th. — Another luminous Barn-Owl seen in Haddiscoe marshes by Mr. L. C. Farman, an observer not likely to be mistaken, flitting across the marshes near Haddiscoe Dam at about six paces from the ground. It showed very bright at times, and then frequently vanished, no doubt as its breast and head turned away from the observer; but soon it was seen to appear again in the distance, sometimes showing up exceedingly bright. On two subsequent nights Mr. Farman had opportunities of watching it, and one or two other persons also saw it. As Haddiscoe is thirty miles from where the other luminous pair were seen, it could not have been one of them, though the same causes, whatever they were, may have operated to produce it.

27th.—A flock of five White-eyed Pochards reported to Mr. Bird to be on Hickling Broad, and about the same time a Gadwall and some Wild Swans. Mr. Bird does not say that any of the Pochards were shot, so that their identity is hardly established.

VARIETIES OF PLUMAGE.

January 11th.—Cream-coloured Fieldfare seen at Smallburgh (Bird). 14th. Reported melanism of the Water-Rail at Horsey Broad [for a similar instance, in Hampshire, *cf.* Zool. 1891, p. 67]. 31st. Cinnamon Redwing at Gorleston (E. C. Saunders), and another at Cromer (Pashley).

February 1st.—Pied Blackbird† at Mr. Roberts's, and a few days afterwards a silver-grey one at Martham, as I am informed by Mr. Saunders. 18th. Mr. Saunders received a Blackbird† which exhibited a narrow transverse bar, or "hunger trace" as I believe this appearance is sometimes termed, on nearly every feather of the body, but especially on the tail.

June 1st.—At the beginning of June (D. U.) Mr. H. Wormald saw one of the brown race of Partridges (*Perdix montana*) in a field near Dereham, which he believes it had been frequenting

since Christmas, and not far from where a good unrecorded example† of the same erythrism was shot by Mr. McLean in the autumn of 1906. It is twelve years since this spangled variety (which is figured in 'The Zoologist' for 1900, pl. ii.) first appeared in Norfolk, and if so many had not been shot there would have been a chance of perpetuating a very handsome addition to the English sportsman's bag.

September 1st.—A beautiful variety of the Lesser Tern,† nearly white and apparently adult, shot somewhere between Wells and Cromer, was received by Mr. Pashley, who was told that it had been seen about for some weeks. The primary quills are distinctly tinted with brown, and the dark occiput is quite apparent on close examination. On the same day another variety, also much too remarkable to be allowed to live, was shot at Brancaster, a sight of which I owe to Mr. Pashley, *viz.* a white or rather much pied Ringed Plover,† its plumage chequered with pale brown in patches—not such a striking albinism as the one shot in 1886.

October 23rd.—A white Dabchick† shot in Blakeney Channel, and subsequently disposed of to Mr. Connop, who was good enough to show me this albino in the flesh, whilst its legs still retained a bright lemon hue, the eyes, now somewhat sunken, being apparently pale brown. As none of the shooters had seen it about the harbour they believed that it had only just come over.

THE BIRDS OF THE DISTRICT OF STAINES.

BY GRAHAM W. KERR.

It is two years ago since I wrote in 'The Zoologist' under the above heading, and although during this time I have removed from Staines to Datchet, the distance is only a matter of eight miles, and has made no difference to the ground I work over; so that I shall continue to use the same title for these further notes.

During the two years fifteen new birds have been added to the local list, bringing the total to one hundred and twenty-six.

The reservoirs at Staines attract an ever-increasing number of birds, and from an ornithological point of view are well worth a visit at any time of the year, while during severe weather in winter the number of fowl on the waters is quite remarkable; but it is difficult to make accurate observations of them on so large a piece of water.

The breeding of the Pochard in Berkshire and of the Marsh-Warbler in Surrey are the two chief items I have to record.

RING-OUZEL (*Turdus torquatus*).—A fine bird seen in a meadow near Stanwell, April 1st, 1907.

CHIFFCHAFF (*Phylloscopus rufus*).—Is locally distributed; most plentiful in Windsor Park, but nowhere as common as the Willow-Wren.

WOOD-WREN (*P. sibilatrix*).—After my last notes in 'The Zoologist,' Mr. A. Holte Macpherson kindly wrote to tell me that he had found this bird very common on the east side of Windsor Park.

MARSH-WARBLER (*Acrocephalus palustris*).—This is a bird I had long hoped to meet in the district, and I was therefore extremely pleased when on June 14th, 1907, I found a nest with four eggs in an osier-plantation in the parish of Thorpe, Surrey. This is the first known instance of the bird breeding in the

county. I was examining a small densely overgrown osier-plantation fronting on to the Thames; the plantation had not been cleared for several years, and the undergrowth was exceedingly thick. There were several Reed- and Sedge-Warbler's nests, one of the former containing two eggs and one Cuckoo's. Some twenty yards back from the river I flushed a bird from a nest which after some searching I found placed low down in the fork of a small osier-bush almost completely covered with a mass of tall grasses and nettles. In the nest were four splendidly marked eggs of the Marsh-Warbler. The bird was very shy, and although I waited for a long time I could get no good view of it, though all the time it was hopping about near by in the undergrowth. On June 25th I again visited the plantation, and found another nest placed two or three feet from the ground in a thick clump of tall grass, three or four stems of which were woven into the sides of the nest, which again held four finely marked eggs. Once more I had great difficulty in getting even a glimpse of the bird. I wrote to Mr. L. B. Mouritz, who is interested in Surrey ornithology, and together we visited the spot on July 13th. The result was disappointing, as we found the nest empty, and could see no sign of the birds; nor was I any more successful on two subsequent visits. The chances of the birds returning to the plantation are, I am sorry to say, not very bright, for the area is very small and has been partially cleared for the erection of bungalows. A mile or so distant there is another dense and much more secluded osier-bed, and I expect that it will be here, if anywhere, that I shall meet the birds this spring.

BRAMBLING (*Fringilla montifringilla*).—Mr. E. Pettitt, a keen and capable ornithologist, writes me that he saw two birds near the Staines Reservoirs on Jan. 12th, 1908, and later in the month one bird near the same spot.

HOODED CROW (*Corvus cornix*).—On Oct. 28th, 1905, I saw one feeding with Rooks and Jackdaws in a newly ploughed field at Datchet. On Jan. 27th, 1907, I saw one standing on the ice at Virginia Water, trying to dig out some prey that was frozen into the ice, which was not very strong. I spent the morning of March 3rd at Virginia Water, and saw several of the birds. I did not see more than one at a time, so it may have been the

same bird, but I am strongly of the opinion that there was a small party of them. It is probable that in some years small parties winter in the Park, though this year I have not been able to locate them.

COMMON SHELD-DRAKE (*Tadorna cornuta*).—A flight of six were seen on the Staines Reservoirs in severe weather, Dec. 31st, 1906.

GOLDEN-EYE (*Clangula glaucion*).—On Dec. 29th, 1906, I found quite a number of Golden-eye on the Staines Reservoirs, and I think it may now be said to be a regular winter visitor, though not to be looked for until hard weather sets in. Christmas, 1906, was an old-fashioned one, with plenty of snow and frost. There were a great number of Duck on the reservoirs; several I knew to be strangers, but as I was unable to identify them with certainty they must be omitted from these notes. It is exceedingly difficult to make sure of birds on these reservoirs; usually they keep well out in the middle, and even with good glasses the distance is too great for accurate identification. The slightest breeze ruffles the water into a sea and increases the difficulties. This January the frost was severe enough to cover the waters with a thin coating of ice, and I had great hopes of seeing two or three new birds. When I arrived there early in the morning a fog prevented me seeing more than fifty or sixty yards; the sun was shining overhead, and looked as though it might break through at any moment. Occasionally a shaft of light would struggle through for a minute, and show the ice in the centre black with Duck sitting and standing about. I remained until evening, but had no luck, though out of the fog came a very medley of bird-calls. The next day I had a similar experience, and on the following day the weather became mild, with high wind and rain. It was bad luck to lose such a chance, especially after two very cold days of watching.

POCHARD (*Fuligula ferina*).—I cannot find that there is any record of the Pochard having bred in Berkshire, but I can now record that at least six pairs nested on a certain pond in Windsor Park last year (1907). I expected to find the Tufted Duck doing so at the same spot, but after much searching I failed to find any nest, though I think it very likely that I shall do so within the next few years.

(From my Note-book.)

May 5th, 1907.—On one of the ponds in Windsor Park one pair of Tufted Duck and six pair of Pochard still remain, and spring is now so far advanced that it is reasonable to suppose that both birds may breed here; whether it is possible to wade through the thick belt of reeds in order to make sure of this remains to be seen.

19th.—To-day Mr. Pettitt and I succeeded in wading out to one section of the reeds round the pond in Windsor Park. It was difficult work, but we were well rewarded in finding two nests of Pochard with eight and nine eggs; in the smaller clutch the young were just chipping through the shell, while the nine eggs appeared quite fresh. The eggs are somewhat larger and of a deeper colour than those of the Mallard. There were several male and female Pochard on the water, though not in company. We saw no Tufted Duck.

June 9th.—I do not know when I have spent a more uncomfortable morning. Mr. Pettitt and I waded right round the pond in Windsor Park. It was desperately hard work floundering about up to our waists in mud and water, the perspiration streamed down our faces, and swarms of midges, disturbed by our progress through the reeds, buzzed around our heads, while every step brought up great bubbles of foul-smelling gas. After four hours in the water we were heartily glad to get ashore again. The result of the morning's work was fifteen Reed-Warbler's nests, one with a young Cuckoo a few days old, and another with a Cuckoo's egg; three nests of Pochard with seven, seven, and eight eggs (tested in the water all these clutches showed signs of being much incubated). The other nests met with were Coot, Moorhen, Mallard, Great Crested Grebe, and Reed-Bunting.

Pettitt and I were both scared several times by some bird (?) that we could not get a glimpse of; right under our feet there would suddenly be a great commotion in the water, and something was rushing about and splashing below the surface. It happened to me first, and when I told Pettitt about it he laughingly said, "Mind you are not grabbed by a Crocodile." Later on the same thing happened to him, and he admitted that it was much too like the swirling of a Crocodile to be pleasant,

and, as he has had experience of Crocodiles on the West Coast of Africa, he knows something about them. We never decided what caused the commotion; it may have been large Pike we disturbed, but I fancy it was some bird, probably Great Crested Grebes. I remember disturbing a Coot from her nest once; she remained on the surface calling loudly, and wildly throwing the water about.

20th.—Paid another visit to the pond in Windsor Park, and found another nest of Pochard with eight eggs, and also saw a brood of six swimming on the water. We found a vast number of Reed-Warbler's nests, three of which contained Cuckoo's eggs, and under three other nests we saw fully-grown young Cuckoos that had fallen out of the nests and been drowned. This points to a heavy death-rate among them when the eggs are placed in nests over water. We again met with several "Crocodiles," but got no nearer to solving the mystery.

October 27th.—Some fifty Mallard, about twelve pairs of both Pochard and Tufted Duck, three or four Teal, and one Snipe were seen at the pond in Windsor Park to-day. Several Great Crested Grebe were swimming with half-grown young; they kept close company, and the young were uttering a squeaking cry which sounded from the distance like the twitter of some Finch. The curious striped markings of the young were clearly discernible. They must have been rather late broods. One Swallow was seen.

RINGED PLOVER (*Ægialitis hiaticola*).—Mr. L. B. Mouritz informs me that he saw a Ringed Plover at the Staines Reservoirs on Aug. 18th, 1907.

WOODCOCK (*Scolopax rusticula*).—One was shot at Wraysbury by Mr. W. Broughton, Sept. 29th, 1906.

COMMON REDSHANK (*Totanus calidris*).—Mr. Mouritz saw two at the Staines Reservoirs, July 18th, 1907.

BLACK TERN (*Hydrochelidon nigra*).—An immature bird flying over Virginia Water lake, Oct. 13th, 1907. (Another of Mr. Mouritz's notes.)

COMMON TERN (*Sterna fluviatilis*).—On May 12th, 1906, I saw a flock of quite a hundred Common Tern on the river at Old Windsor; they were beating up and down stream in search of fish, and many of them passed within a few yards of me. Time

after time they dived into the water and brought out fish the size of Bleak or small Roach, which they swallowed head first while still on the wing. The next day I could find no sign of the birds. It is not uncommon for one or two Terns to come up the Thames in the autumn, but I do not think I have any note of their occurrence in spring, and I have certainly never seen such a large flock.

EARED GREBE (*Podiceps nigricollis*).—There were not many birds on the waters when I visited the Staines Reservoirs on Oct. 13th, 1907, but a small Grebe at once attracted my attention, and there is no doubt that it was an Eared Grebe in winter plumage. It was very tame, swimming quite close in to the side and moving at a great pace. On Oct. 26th the Eared Grebe was still in the same corner of the reservoirs, and I watched it for a long while; the beak is curved slightly upwards, which I do not remember to have noticed with any other Grebe. After diving it came to the surface with a fish, and then brought one foot out of the water to help it get the fish into the right position for swallowing.

The most important of my other notes is perhaps the occurrence of the Great Northern Diver, being the third appearance of the bird since 1881. It seems curious that it should have so often visited such an inland district.

On Christmas Day, 1905, I visited the Staines Reservoirs, and almost immediately sighted a Great Northern Diver swimming at one hundred to one hundred and fifty yards from the side. The bird was not alarmed at my presence, and I watched it for a long time. It dived and came up with quite a large fish, which it swallowed; it also scratched its head with its foot, showing its under parts nicely. The next day the bird was further out, and I could not see it so well. On Jan. 1st, 1906, I had only just located the Diver when it rose and flew for some distance, passing quite close to where I was standing. The flight was high and powerful, the neck being stretched out in front and the legs behind. I did not see the bird after Jan. 28th; it then seemed to be quite at home, and to find plenty of fish. I tried to time the length of its dives, but was not very successful, as the bird pops up suddenly, and so far away from the spot it went down at that it is very hard to see it directly it comes up.

I see that in my last notes I described the Corn-Bunting as resident. This was a mistake; the bird is migratory, arriving early in April and remaining until about the end of September. I felt sure that it bred at Staines, though I have never found the nest. This year, after a whole morning's watching, I found a young bird just able to fly which was being fed by its parent.

Instances of birds sharing the same nest are uncommon, but I met with two cases last year. A Yellow Bunting I flushed from a small bush at the side of a ditch was sitting on two of her own eggs and two Whitethroat's. I think the nest was built by the Whitethroat, but could not be sure. Another similar case was a Reed-Warbler's nest built in nettles which held three Reed-Warbler's eggs and one Sedge-Warbler's. Four days later the Sedge-Warbler's egg had vanished, and the Reed-Warbler was sitting on her own three eggs. A Hedge-Sparrow built a nest in the head of a sprouting broccoli in the garden, but the wind blew the nest and eggs to the ground. A still more extraordinary Hedge-Sparrow's nest was built in an osier-bed, entirely suspended in giant nettles; the nettles were very dense and tall, and several stems were woven into the nest after the Reed-Warbler's style; yet the nest was undoubtedly built by the Hedge-Sparrow, and the bird was sitting on five eggs. I twice found two Cuckoo's eggs in the same nest, but I think my notes on the Cuckoo must be dealt with later on in an article to themselves.

The movements of the Stonechat in this district have been very peculiar. Formerly it was a local resident, and I regarded it as an increasing species. In 1906 I know that at least three families were reared, but that autumn the birds entirely disappeared, and none were seen for more than twelve months. In November, 1907, two were seen back in their old haunts, but since then they have again entirely left the neighbourhood. I happened to mention this to Mr. Mouritz, and he said that it was certainly curious, as he had a note that the Stonechat had not been seen in Richmond Park for over a year.

During the last two winters a flock of some fifty Black-headed Gulls have frequented the river and Eton Playing Fields; they may often be seen far away from the river, following the plough in company with Rooks and Jackdaws.

NOTES FROM LAKELAND, CUMBERLAND AND
WESTMORLAND, 1905.

BY T. C. PARKER.

THE following notes are derived largely from the Tullie House (Carlisle) Museum's Records, kept by Messrs. D. L. Thorpe and L. Hope, but whatever is placed in brackets thus [] has been collected from other sources.

The records were published in a local newspaper early in 1906, and may be of interest to readers of 'The Zoologist,' as, since the lamented death of the Rev. H. A. Macpherson in 1902, Lakeland has not had a regular correspondent to this Journal.

"The mild and open spring of 1905 was no doubt greatly responsible for the early arrival of many of our summer visitants, and the slight frosts in January and February were probably partly responsible for the presence of numbers of wildfowl on our inland waters during those months, inasmuch as these conditions have the effect of hastening or retarding migration, and when met by a retarding influence the birds will congregate in large numbers in suitable feeding places.

A remarkable assemblage of wildfowl was observed on Talkin Tarn during January, when it was estimated that there were not less than five hundred waterfowl belonging to seven different species, including a pair of Smews, a rare species of the *Anatidæ*, possessing a beautiful silvery-white plumage with black markings, and only recorded about twenty times or so previously for Lakeland; several Goosanders, four of them old males, with rich salmon-pink coloured breasts; some Golden-eyes, with the handsome black and white plumage of the adult male, and the sober brown and white of the female; Tufted Ducks, with their conspicuous white flank-feathers and erectile crest; several Mallards or common Wild Ducks; and lastly a large gathering of Ducks, which on close examination proved to be Pochards. These were roughly counted to two hundred and fifty birds,

which seems to be a record number for Lakeland, as the late Rev. H. A. Macpherson, in his 'Fauna,' says that he never saw or heard of a party of more than twenty in that area. Dr. Heysham considered it a scarce bird in his day.

The Grey Geese were again numerous on the Solway Marshes, and the Grey-Lag now appears to be the predominating species, although five or six years ago the Pink-footed Goose was by far the most plentiful species.

The Bernacle Geese lingered in the district until May 6th, when a flock of about fifty to sixty birds were seen on Rockliffe Marsh."

[Macpherson, in his 'Fauna of Lakeland,' p. 251, says the Bernacle Geese generally leave the Solway in March and April, but sometimes a few linger into May.]

"One or two notable occurrences of rare birds have taken place, the one which more particularly came under our notice being the visitation of an Iceland Gull to the Eden. This species has only been recorded four times previously for Lakeland. The example mentioned spent several weeks during January and February about the junction of the River Caldew and River Eden, and was seen repeatedly during that time.

One of the most interesting occurrences in the ornithological annals of this county is the fact that a young Whooper Swan* (the larger of the two species of Wild Swans which visit this country) took up his quarters during the winter on the Eden, in association with the herd of Mute Swans belonging to the Corporation of Carlisle. On its arrival it was in immature dress of the first year, but assumed the white dress and yellow cere of maturity during its stay. It lived upon the most amiable terms with its tame relations, and whenever the herd was annoyed by dogs, or other trouble threatened, constituted itself their protector. Such an occurrence appears to be without parallel, and Prof. A. Newton says that the Mute Swan generally evinces hostility rather than friendship to his wild relations. As the time of migration drew near curiosity was felt as to how the Whooper would act—whether he would be content to remain in his comfortable quarters or to return to his Arctic home—and on May 12th we were grieved, but not surprised, to hear that the

* Cf. Zool. 1906, p. 193.

keeper had seen him fighting towards the Solway in company with two of his companions.

Several species of birds appear to be on the increase in the area covered by our notes. The Hawfinch has bred in Westmorland for several years past, and is steadily extending its range northwards. It has been observed at several different places in Cumberland during the past summer, and will probably soon become a well-known bird to the kitchen gardener, amongst whose pea-crop it plays havoc with its strong stout beak.

The Greater Spotted Woodpecker is becoming decidedly more numerous, a fact which should give dissatisfaction to no one, as the species feeds largely on insects and larvæ which are harmful to forest-trees. The Black Grouse appears to be on the increase in Westmorland, perhaps also in Cumberland, as also are the Lapwing,* Common Wild Duck, and several other less noteworthy species. On the other hand, one or two of our resident birds are alas! yearly becoming scarcer. In spite of its great adaptability, the Common Buzzard will soon become, like the Hen-Harrier and the Kite, a memory of the past. Where the Raven and Peregrine Falcon hold their own, the Buzzard, perhaps owing to her nest being more accessible, is becoming yearly less numerous." [Macpherson, in his 'Fauna,' mentions a nest of the Buzzard in Westmorland on a certain low face of rock, "which is so easy of access that even a child could reach it without incurring any risks, and yet the Buzzard has nested there on two occasions within the last decade." It is to be much regretted that these noble birds are not allowed to nest and rear their young in peace, and add further beauty to their surroundings.]

"The Starling is a model of adaptability and perseverance among the birds. Sixty years ago he was scarcely known amongst us; now he is everywhere, and, not satisfied with a normal nesting-time, actually makes a nest and hatches a brood of young in December.

An extremely early nest of the Dipper, locally known as the Water-Ouzel or Bessie Dooker [I have heard also Peggie White-throat] was recorded from Holme Head, the young birds being

* Their eggs are protected from April 15th to July 1st by a Cumberland County Council bye-law.

hatched about March 13th. The same pair of birds had another nest and eggs before the first brood had got well on to the wing."

The following are the chief notes of interest sent in during the past year :—

JANUARY, 1905.

1st.—Great Spotted Woodpecker seen at Salkeld (H. Britten). [Also on several other occasions during the month.] Great Northern Diver seen on Windermere (W. E. B. Dunlop).

18th.—Vast assemblage of waterfowl, including Pochards (about two hundred), Tufted Ducks, Golden-eye, Mallard, Coot, Goosander (four), and Smews (two), seen on Talkin Tarn (D. L. Thorpe and L. E. Hope).

21st.—A Red-breasted Merganser and Smews seen at Talkin Tarn (T. L. Johnston).

26th.—Iceland Gull in the dress of second or third year seen on the Willow Holme opposite Etterby Scaur (D. L. Thorpe).

28th.—Six Bewick Swans seen to alight on Skinburness Marsh (W. Nichol).

30th.—Mistle-Thrush in song at Great Salkeld (H. Britten).

FEBRUARY.

4th.—Iceland Gull again observed (D. L. Thorpe).

6th.—Chaffinch in song at Great Salkeld (H. Britten).

[7th.—Song-Thrush commenced to sing at Salkeld; also Wood-Pigeons and Stock-Doves heard cooing (H. Britten).]

10th.—Green Sandpiper seen, which had frequented Skinburness Marsh for two or three months (W. Nichol).

[11th.—A Jack-Snipe seen at Salkeld. This is the only occasion on which this bird has been seen during the present winter. This bird used to visit the area around Salkeld in numbers, arriving at the end of October or in early November, and leaving again in March; but on referring to my notes I find that this species has been visiting this part of the Eden Valley in gradually decreasing numbers for several years past. In 1904 its first appearance for the winter was Jan. 2nd, and a pair were seen on Feb. 26th near Lazonby Fell. These were the only occurrences during that year (H. Britten).]

13th.—Peewits mating at Nunwick, Great Salkeld (H. Britten).

16th.—Rooks building nests at Horsegills, Kirklington (T. W. Sharp).

23rd.—A Black-headed Gull at Stanwix assuming nuptial dress; head nearly all dark brown (L. E. Hope).

26th.—Hawfinch seen at Rickerby (W. H. Little).

[A large flock of Golden Plover have been seen on two different occasions during the present month near Great Salkeld. Flocks of these birds seldom visit this part of the county, and when they do never make a long stay, though usually plentiful nearer the Pennines. Macpherson says:—"Within the last days of February many parties of Golden Plover usually make their appearance in the fields in the neighbourhood of the English Solway. These immigrants, most of which are beginning to assume the black breast, only stay with us a few days, and then depart in an easterly direction." No doubt these are of the same flocks from the Solway, making their way gradually up to their moorland nesting haunts (H. Britten).]

[The Blackbird began to sing during the last few days of the month at Great Salkeld (H. Britten).]

MARCH.

13th.—Dipper's nest with four young hatched at Holme Head—a very early nest (R. Leighton). [Also *cf.* T. L. Johnston, Zool. 1905, p. 179.]

19th.—Ravens nesting; nest with eggs near Windermere (W. E. B. Dunlop).

24th.—Wheatear seen at Whinfell, Penrith; an early arrival (Charles Britten).

27th.—Sand-Martins seen at Langwathby (H. Britten).

29th.—Single Swallow seen at Windermere; an early arrival (A. E. Rawson).

APRIL.

2nd.—Sand-Martins flying over Siddick Ponds, Workington (C. J. Phillips). [Swallow seen at Salkeld. This bird, like the Sand-Martins, would be seen one day and then disappear for several days, while it was the 14th before these two species rightly came to stay (H. Britten).]

5th. — Ring-Ouzel arrived in Lake District, Windermere (W. E. B. Dunlop).

6th. — Herons near Carlisle have young (J. B. Cairns).

7th. — Swallows arrived at West Seaton, near Workington (C. J. Phillips). [An Oystercatcher in Salkeld district (H. Britten).]

9th. — Willow-Wren seen at Monkhill (B. Johnston).

11th. — Brood of young Woodcocks at Castletown (J. B. Cairns).

[12th. — Common Sandpiper seen at Nunwick (H. Britten).]

14th. — Cuckoo heard near Floriston (J. B. Cairns).

15th. — Male and female Pied Flycatchers seen at Wetheral (T. L. Johnston). Large numbers of Red-throated Divers on the Solway (W. Nichol).

17th. — Blackcap seen at Wetheral (W. H. Little). Redstart seen at Nunwick (H. Britten).

21st. — Hawfinch, Spotted Flycatcher, and Redstart seen at Newby Grange (E. Hodgson). Common Sandpiper at Linstock (W. H. Little).

24th. — Grasshopper-Warbler heard at Todhill's Moss, and a Starling's nest amongst the branches in a Scotch fir-tree (J. B. Cairns). Whinchat seen at Salkeld (H. Britten).

[25th. — Sedge-Warbler seen on banks of River Eden at Great Salkeld (H. Britten).]

29th. — Sedge-Warbler and Pied Flycatcher arrived at Windermere (W. E. B. Dunlop). Three Swifts at Loshville, Etterby Scour (D. L. Thorpe). Spotted Flycatcher at Rickerby (W. H. Little).

[30th. — Cuckoo first heard near Salkeld (H. Britten).]

MAY.

1st. — Red Bank-Vole sent to Carlisle Museum from Nunwick (R. Heywood Thompson). [House-Martins arrived at Salkeld; a number seen hawking for insects over the river (H. Britten).]

3rd. — One or two Shoveler Ducks and Black-tailed Godwits seen on Salta Moss (R. Mann and R. Williamson).

4th. — Cuckoo and Sedge-Warbler at Holme Eden (W. H. Little). Cuckoo heard at Windermere (W. E. B. Dunlop).

5th. — Curlew's nest, one egg, found at Windermere (W. E. B. Dunlop).

6th. — Flock of fifty or sixty Bernacle Geese still on Rockcliffe

Marsh (L. E. Hope). A Song-Thrush's nest, built in ivy, covered and protected by a leaf, which had been evidently intentionally introduced by the bird ; Windermere (W. E. B. Dunlop).

7th.—Corn-Crake heard at Linstock (W. H. Little). Buzzard's nest with three eggs, Lake District (W. E. B. Dunlop).

[9th.—Whitethroat seen at Salkeld (H. Britten).]

[10th.—Swift and Spotted Flycatcher arrived at Nunwick (H. Britten).]

13th.—Seven Whimbrel seen on Rockcliffe Marsh (R. Graham). Four Bernacle Geese seen on Rockcliffe Marsh (T. L. Johnston). Peregrine's nest, three eggs, Lake District, Windermere (W. E. B. Dunlop).

[14th.—A pair of Pied Flycatchers observed carrying materials for their nest at Edenhall (H. Britten).]

[15th.—Corn-Crake first heard—very scarce so far—Great Salkeld (H. Britten).]

20th.—An instance reported of a Waterhen hatching her eggs after her nest had been bodily removed from its original site on Tarn Lodge (G. B. Routledge). [A pair of Blackcap Warblers on roadside near Edenhall. A bird rarely seen in this district (H. Britten).]

26th.—An instance of a Song-Thrush laying her eggs on the bare ground, under a bramble-bush, at Horsegills, Kirklington (T. W. Sharp).

(To be continued.)

NEWFOUNDLAND SEALING, 1907.

BY THOMAS SOUTHWELL, F.Z.S.

OWING to the lamented death of my valued correspondent, the late Sir Robert Thorburn, I had contemplated discontinuing these Newfoundland Notes, but such readers as have followed me hitherto may perhaps like to be furnished with the statistics for the season of 1907. I therefore send a summary of the results, for which I am mainly indebted to Mr. L. G. Chafe's Annual Circular.

The fleet of twenty-four vessels sailed as usual on Monday, March 11th, encountering terrible weather from the commencement. The 'Leopárd,' which left St. John's on March 6th for Channel, which was to have been her port of departure, during a desperate snowstorm next day ran on the rocks near Renewes, and became a total wreck; happily her crew, after much suffering, effected a landing in safety. Later on the 'Greenland' with a broken shaft was driven seaward in a blizzard, leaking badly, and had to be abandoned one hundred and twenty-five miles E.S.E. of Bonavista, her crew being rescued by the other steamers. Thus the severity of the weather and the heaviness of the ice-pack combined to render the season, with the exception of 1905, the worst since 1898.

Deducting the two wrecked steamers, the remaining twenty-two vessels secured 245,051 pelts, being 96,785 less than in the previous year, the money value of which showed a decrease of £30,467. The first vessel to return was the 'Grand Lake,' on March 27th, with 10,739 Seals. The 'Neptune' headed the list with 30,985 Seals, only five vessels having above 15,000; seven others had above 10,000, and ten others below that number; the average of the twenty-two vessels was 11,139, ten vessels being above that number and twelve below it. Thus there were very few which made a paying voyage. Of the 245,051 Seals killed, 222,713 were young and 4490 old Harps, 14,869 Bedlamers, 2913 young and 66 old Hooded Seals. The market price for young pelts was 4·20 dols. and for old ones 3 dols. per cwt.

ON *ARMADILLIDIUM ALBUM*, DOLLFUS, A RARE
WOODLOUSE NEW TO THE FAUNA OF GREAT
BRITAIN.

BY RICHARD S. BAGNALL, F.E.S.

IN a recent issue of 'The Zoologist' (1907, pp. 465-470), Mr. Bruce F. Cummings contributed an interesting paper on some Woodlice recently taken by himself in the neighbourhood of Barnstaple, and mentioned a small white species of *Armadillidium* which he was unable to identify. At my request Mr. Cummings kindly submitted examples to me, and I at once recognized them as being referable to *Armadillidium album*, described by M. Dollfus in 1887 as follows:—

ARMADILLIDIUM ALBUM, n. sp.*

Corpus valde convexum, crebre granulatum et minute hirsutum. Frons antice subrecta, medio nec depressa nec foveata. Oculi nigri, ocellis circiter 12. Epistoma scutello lineam frontalem vix superante eamque valde adpresso. Tubercula antennaria parva, rotundate quadrangula. Antennæ hirsutæ; flagelli articulus prior altero triplo vel quadruplo brevior. Segmentum caudale latius quam longius et fere semisirculum. Articulus basalis pedum caudalium magnus; ramus exterior parvus, multo brevior quam latior, ramus interior parvus, truncatus. Album, uniforme. Long. 6 millim., lat. $2\frac{3}{4}$ –3 millim. Plage d'Arcachon.

In the same publication M. Dollfus adds:—"18. *A. album*, A. D.—Plages de sable du Sud-Ouest, sous les pierres et les pièces de bois. Arcachon (Gaillard, A. D.), in coll. A. D."

In 1892 Dollfus published his "Tableaux Synoptiques de la Faune Française: Le Genre *Armadillidium*,"† a paper which should be in the hands of all naturalists interested in the

* "Diagnoses d'Espèces Nouvelles de la Tribu des Armadilliens" ('Bulletin de la Société d'Etudes Scientifiques de Paris,' 1887, p. 4) (*separatum*).

† "Catalogue des Espèces Françaises de la Tribu des Armadilliens," *loc. cit.* p. 7 (*separatum*).

Terrestrial Isopod Crustacea. Figures are there given of the different species, and show at once how very distinct this creature is from all other European species of the genus. It will therefore be better to briefly mention a few of its chief characteristics rather than make difficult comparisons, as a comparison with another species always suggests—to me, at least—a closer affinity than is very often the case. The body is strongly convex, dull, and has the dorsal surface *closely granular and sparsely set with minute hairs*. The frontal cephalic lobe is low, narrowly extended and very broad, the side lobes being comparatively small. The antenna is short, covered with hairs, and has the last joint of the flagellum more than three times the length of the basal joint. The first segment of the mesosome does not extend laterally beyond the head. The last segment of the metasome is much broader than long, and has the extremity broadly rounded; the outer ramus, too, is much broader than long, and is *armed with a distinct tooth at the outer apical corner*, whilst the inner ramus is very short, comparatively broad, and truncate. The colour, according to Dollfus, is of a uniform white,* but one or two of Mr. Cummings's specimens have the segments of the mesosome partially shaded with grey.

I am told that a specimen of this species, taken by Mr. C. A. Briggs, of Tynmouth, was sent to Mr. A. M. Webb for identification, and returned as the common *A. vulgare*. If no mistake has been made in my information, I am compelled, with all due respect to Mr. Webb, to differ. In size, colour, character of dorsal surface, and structure the two species—*album* and *vulgare*—have absolutely no conceivable point in common which could lead to the one being mistaken for the other.

In his paper last cited, Dollfus writes:—" Cette petite espèce, si singulière, m'a été par M. Gaillard, qui l'avait reçue d'Arcachon, en Mars 1886, sans designation spéciale d'habitat. Au mois d'Octobre de la même année, j'en ai trouvé moi-même trois exemplaires, sur la plage d'Arcachon, sous une planche échouée devant Saint-Ferdinand; depuis et malgré des recherches répétées il m'a été impossible d'en retrouver un seul échantillon. Peut-être s'agit-il d'une espèce introduite et qui ne si sera pas acclimatée."

* 'Feuille des Jeunes Naturalistes,' ser. iii. 1892.

The English specimens, on the capture of which Mr. Cummings is to be congratulated, were taken on the sands under seaweed, &c., at the estuary of the Taw and Torridge, Devonshire, and the fact that they occurred in Devonshire (in which county we find the South European forms—*Philoscia couchii*, Kin., *Metoponorthus cingendus*, Kin., and *Armadillidium nasatum*, B.-L.), and in a precisely similar habitat as the French examples, goes to prove, I think, that *A. album* is an indigenous form, and not, as Dollfus suggests, a species probably introduced. A systematic search in the south-western counties of England, after a study of the distribution of species such as those just mentioned, will almost certainly bring further interesting Woodlice to light, and add considerably to our knowledge of the British Terrestrial Isopoda, in which group a large amount of work has already been achieved since the publication of Messrs. Webb and Sillem's 'British Woodlice' in 1906. So far as I am aware there are no further records of *A. album* to be noted.

NOTES AND QUERIES.

 AVES.

Tits feeding on Maize.—On the 15th inst. I was watching three species of Tits—Blue, Great, and Cole—in Bingley Wood, all feeding greedily on maize, or at least the softer portions of the grain—perhaps the germs only. Their usual method was to take each grain into the nearest tree, and peck away until they secured the desired morsel, which process occupied but a few moments, after which they allowed the residue to fall to the ground, the rejected matter beneath the trees forming quite a litter for a considerable area. Formerly the Cole-Tit did not take to Indian corn so freely as the Blue Tit, the latter having been fond of this food ever since it was first largely used in feeding poultry and Pheasants; but at present, even in mild winter when other and more natural food is readily procurable, maize must constitute a by no means unimportant part in the bill of fare of three species of Titmice which frequent our woods in winter. Whilst watching the Titmice a Redbreast came within a few feet from where a gamekeeper's son and I were standing, and bolted several pieces of Indian corn. I thought I had seen it previously doing so when it was about fifteen yards distant, but was hardly prepared to believe this to be possible until it came close to us.—E. P. BUTTERFIELD (Bank House, Wilsden).

Rough-legged Buzzard in Hants.—A female of this grand winter visitor was killed a few miles from Ringwood on Feb. 8th, and I saw it soon after it was shot. It measured just over twenty-three inches in length, was forty-eight inches across its expanded wings, and weighed exactly three pounds. Though of course destitute of the Owl-like disk of feathers about the face, the *softness* of its plumage, reminded one very forcibly of the *Strigida* (even more than the plumage of the closer allied Harriers), and the form of the eyes, so enlarged in the socket behind the eyelid, increases the similarity, indicating, I suppose, that *Buteo lagopus* often seeks its prey far into the dusk. In the stomach I found what I think were the remains of a Rabbit, from the length and quantity of fur mixed therewith, but if

this supposition be correct, another rodent must have been its last meal anticipated, as in its throat the hind leg of a Rat was unmistakable. The toes and claws of the bird were very dirty, as if it had been "scratching," of which their robust form seemed quite capable, but the feathers of the legs were both long and graceful, of a buff colour streaked with dusky arrow-headed markings. The head was hoary, with small dark streaks, from each feather having a dark central area; the rest of the body was of various shades of dark brown, mottled here and there with whitish, the most conspicuous being a light patch in the middle of the breast. The eyes were brown. I heard of two other specimens in distant parts of the county, but let us hope their lives are still intact. I have but three previous records of the species in this immediate neighbourhood, so its occurrence is interesting to me.—G. B. CORBIN (Ringwood).

Honey-Buzzard in North Wales.—I have in my possession a fine male Honey-Buzzard (*Pernis apivorus*), which was shot at Abergele, North Wales, Oct. 15th, 1907.—CHARLES D. HEAD (2, Mount Vernon, Dollymount, Dublin).

Variety of Wigeon (*Mareca penelope*?).—On March 20th, whilst in Brighton, I saw exposed for sale in a fishmonger's shop a number of Wigeon. One bird in particular attracted my attention, as it had a *broad band of metallic green* running from the eye on each side of the head such as one sees in the Common Teal. Would this be the American Wigeon (*M. americana*)? I was in a great hurry at the time to catch a train, so could not stop to make inquiries as from whence the bird came. It was, however, in very poor condition, and had apparently been dead several days.—GORDON DALGLIESH (Brook, Witley, Surrey).

Notes from South-western Hants.—The past winter, although so keen for a time, was rather unproductive of rarities. A vast quantity of wildfowl frequented the river from time to time, but mostly of the ordinary kinds, the Wild Duck (*Anas boschas*), as usual, predominating, and on account of the changing weather most of the birds were very unsettled, shifting from place to place in a most remarkable and somewhat unusual manner. Wigeon and Teal were in considerable numbers, over one hundred of the latter having been killed at one "shoot," but generally they were not so abundant as they are some winters. Pochard and Tufted Duck appear to be increasing, the latter especially; as to the former, it was a comparatively common winter visitor many years ago, and well known to the sporting

community by the name of Red-headed Ker, or "Polka Duck," but for a considerable time it almost failed to visit this neighbourhood, some winters not one occurring, so I am glad to record its reappearance in some numbers. I cannot, however, do the same with regard to the Goosander or Red-breasted Merganser, which seem to have left us entirely—the latter was always the rarest—but last season there were at least two male Smews in fully adult plumage seen upon the water, one of which was shot, and no doubt they were accompanied by females and immature specimens. I also knew of three or four Gadwall, all immature except one—an old male in fine feather, but so badly mutilated as to be unfit for preservation. A few Shovelers and one or two Golden-eyes, all young birds, were also met with, and I heard of one Pintail, but did not see it. Several "skeins" of Wild Geese were seen, numbering from five to fifteen, but they were very wary, and did not frequent the vicinity of the river where most of the shooting took place, and I knew of only two being killed, although they were about the neighbourhood for several weeks. I saw the head and feet of one of the slaughtered, and it was of the Pink-footed species; whether all were of the same kind I know not. On previous occasions when any of the *Anseres* visited us it was generally the White-fronted (*A. albifrons*), although *A. brachyrhynchus* has been met with previously more than once. Two or three Bitterns frequented the reed-beds near the river, and one was killed at the end of February, but I am glad to say a more humane feeling seems to have sprung up towards this handsome bird, and if seen during a fusillade it is allowed to wing its lazy flight to some place of safety. Some time after the shooting had ceased (on March 1st) a man who often attends the Salmon fishers, and to whom a Bittern is not a stranger, brought me word that he had seen a bird or two on three occasions in the reed-beds, appearing "very tame," standing quietly amongst the "dead spear," with its neck straight and beak pointing upwards; and, he added, "I should have thought it was a Bittern, but it was not half the size of one—in fact, no larger, if as large, as a Peewit." Could this have been *Ardetta minuta*? The man's description was given in good faith; he had nothing to gain by it, and I think he was ignorant of such a bird as the Little Bittern, but the time of year seems a little out of place, as the few recorded specimens of this species in Hampshire were, I believe, in the summer or autumn months. Still, I could believe in its occurrence here in the second or third week of March much better than the reported notes of the Cuckoo in February, or even earlier in the year.

In connection with the notes (*ante*, pp. 33 and 73) respecting the occurrence of the American Wood Duck (*Æx sponsa*) in this country, I may mention that in November last I knew of a male of this very beautiful species having been killed not far from here, and on Feb. 13th a most superb specimen (male) of what I suppose is the Asiatic representative of this lovely group, *viz.* the Mandarin Duck (*Æx galerita*), with its bantam-like neck, blue and white crested head, beautifully barred and variegated body, feathers, and the large fan-like scapulars standing over its back, was killed a few miles away, and although I am not aware that either species is semi-domesticated upon any private water near here, I do not suppose they were "British" in the general acceptation of the term, and I should not have recorded their occurrence except in connection with the above-mentioned notes; and I suppose in such a catalogue of "escapes" should be chronicled a fine Canada Goose, shot during the winter or early spring. Of the smaller birds, Redwings and Bramblings were at times abundant, but Fieldfares, Siskins, and Lesser Redpolls do not visit this part of the county—the forest especially—in anything like the numbers they formerly did. Last autumn an unusual number of Kestrels were observed, and during the whole winter several Peregrine Falcons frequented the valley of the Avon, and, strange to say, I did not hear of a single specimen of this noble bird being shot, although on several occasions information was brought to me of a "swoop" amongst a flock of Teal, or, singling out a Peewit from its companions, the Falcon made short work of the screaming Plover. One or more of the Hen-Harriers were seen from time to time, both in meadow and field, and, if taking toll of a crippled bird, kept well out of shot itself, and so, let us hope, escaped. The Merlin, as usual, appeared in limited numbers, but I did not hear of one being killed.

At the end of January a fine female Badger weighing twenty-five pounds was trapped on an estate on the western side of the river where the existence of such an animal was entirely repudiated by the gamekeepers, whose experience and knowledge of all wild creatures—according to their own estimation—were beyond dispute; but from the appearance I should say she was not a solitary representative of her kind in the locality where she was found. I knew of four Otters, weighing respectively sixteen, eighteen, twenty-two, and twenty-four pounds, which were either trapped or shot, and several seen within a radius of a few miles, during the first three months of the year, and most probably there were others of which I have no record; but their destruction needs little comment when one sees advertisements for

the skins, offering good prices, in almost every local newspaper, and thus the poor Otter has to die because it wears a fur undercoat, and this same is considered an important and aristocratic decoration for the neck and wrists of his arch-enemy, man!

I understand an unusual number of Salmon have been netted in "the run" at the outflow of the river, and on account of the flooded condition of the stream during the winter a considerable quantity of fish were able to ascend for spawning purposes, as testified by the number of "kelts" that take the fly, but of course are returned to the water; yet a good number of "clean-run" fish—nearly thirty I have heard—have been taken within a few miles with rod and line, several of them scaling over thirty pounds each—one of thirty-nine pounds—and if the river was as clean and suitable as formerly a good hatching should be the result; but I hear that desirable condition is not attainable, and I suppose the natural enemies of the young fry are rather increased than otherwise in the increasing numbers of the Chub, which is not spoken of very favourably in some quarters.—G. B. CORBIN (Ringwood).

AMPHIBIA.

Common Newt (*Molge vulgaris*) in Carnarvonshire.—Up to the time when my 'Vertebrate Fauna of North Wales' went to press I had no actual evidence of the occurrence of the Common Newt in Carnarvonshire or Anglesey, although both the other species are common there. Last summer, however, Mr. D. Witty, of Colwyn Bay, sent me an adult male *Molge vulgaris* which he had taken along with others from a small pond on the Little Orme's Head. The neighbouring ponds contained none of this species, but numbers of Palmated and Great Warty Newts.—H. E. FORREST (Hillside, Bayston Hill, Shrewsbury).

ARACHNIDA.

Curious Habits of Chelifers.—With regard to the Editor's note in 'The Zoologist' (*ante*, p. 77) on the occurrence of a species of *Chelifer* on the wings of a Longicorn beetle in Natal, and his further reference to a similar record from Kilimanjaro, it may be of interest to add an instance from Ceylon. I have on more than one occasion taken *Chelifers* (in one instance as many as seven) from beneath the elytra of one of our largest Longicorn beetles. *Chelifers*—probably of several species—are quite common under the loose bark of various trees in the Royal Botanic Gardens, Peradeniya. They construct small circular retreats of fine silky web. On prizing

off a large piece of loose bark groups of twenty or more of these small nests may be revealed, each containing a single occupant. The eggs of the *Chelifer* are carried at the base of the abdomen, on the under surface, and are arranged in a regular rosette-shaped mass (see fig.). The stems of our trees are frequented by gangs of the large and ferocious ant (*Ecophylla smaragdina*). Occasionally one of these ants may be found struggling vainly to extricate its foot



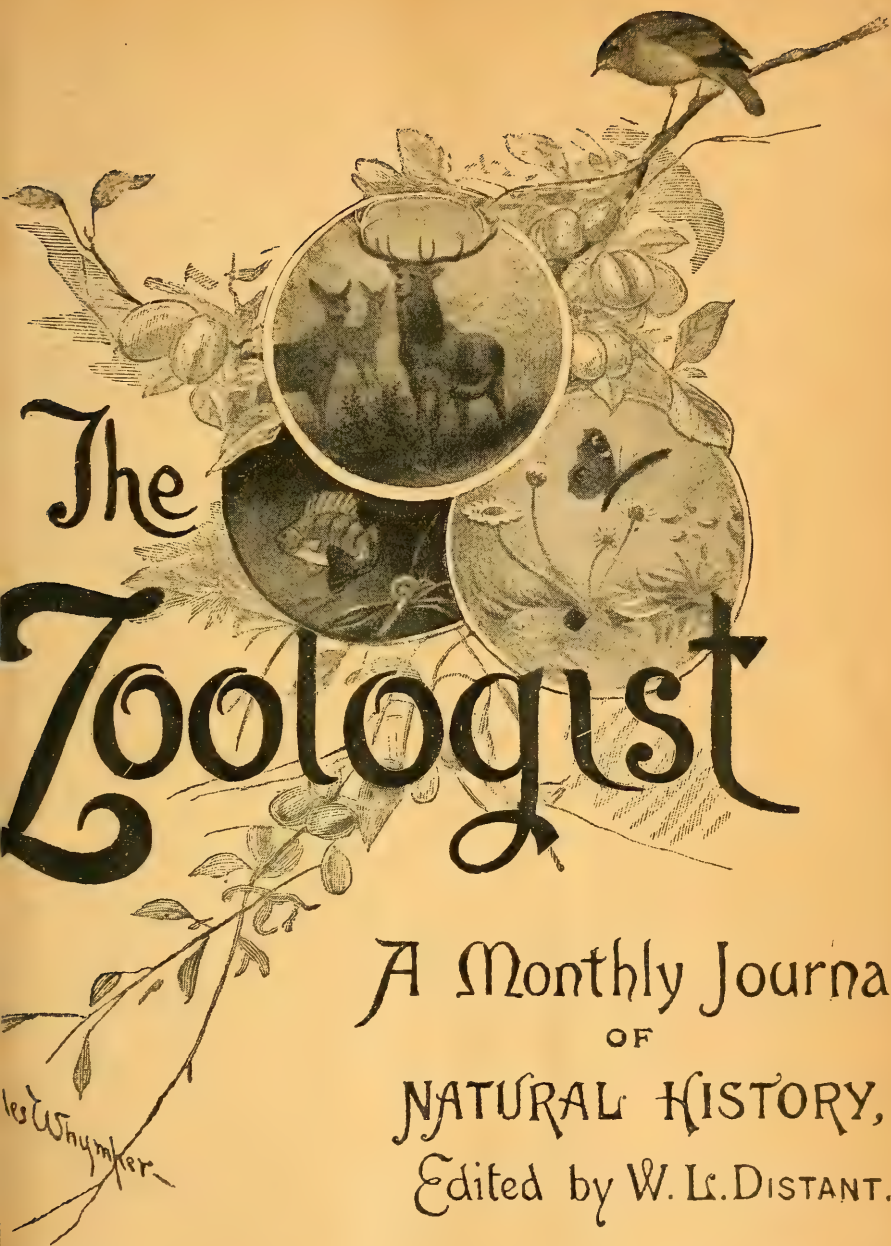
from some crevice in the bark. Investigation will show that the foot is firmly held in the chela of a small *Chelifer* safely ensconced beneath the bark. And there it may be held day after day until it dies of starvation. I have found the ants hanging dead still in the grasp of their captor. I do not think that the *Chelifer* has any special purpose in the capture.

I have never seen one feeding upon the ant. The probability is that the little animal instinctively grasps the intruding foot, and holds on pertinaciously as long as it feels any resistance.—E. ERNEST GREEN (Peradeniya, Ceylon).

OBITUARY.

JOHN THOMAS CARRINGTON.

MANY will regret to learn that this naturalist—for he was more than an entomologist—passed away on March 5th last at the age of sixty-two. Mr. Carrington was born on March 21st, 1846, and originally studied for the medical profession, but after travelling in America and Africa he may be said to have almost settled down to journalism as a profession. He edited the 'Entomologist' for some years after the death of Edward Newman, and until a change took place in the proprietorship of that magazine. His editorship was marked by tact and discretion, for apart from the knowledge of his subject he possessed broad views, and was actuated by a genial disposition. For many years he was on the editorial staff of the 'Field,' and also, in 1893, became proprietor of 'Science Gossip,' which he edited until that journal predeceased him in 1902. He was of a kindly and pleasant nature, and did much good work in his own way for the cause he had at heart.



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THE ZOOLOGIST

No. 803.—May, 1908.

FIELD-NOTES ON THE BIRDS OF THE RAVEN- GLASS GULLERY.

BY CHARLES OLDHAM, F.Z.S., M.B.O.U.

THE little village of Ravenglass on the Cumberland coast was in Roman and mediæval times a port of considerable importance, but the silting up of the bar long ago made it impracticable for shipping, and its traffic is now limited to a single fishing-boat. Its great, shallow, land-locked harbour, formed by the conjunction of the estuaries of three rivers, the Esk, Mite, and Irt, is to-day at low tide a waste of sand and mud, the haunt during the winter months of innumerable wildfowl, and in spring and summer a favourite spot for studying the habits of the birds which breed on the extensive stretch of sand-dunes that shelters the harbour on its seaward side. To most people Ravenglass is known merely as the junction on the Furness Railway for the primitive toy line which affords access to the beauties of Eskdale and some of the most romantic scenery of the western fells of the Lake District; but the village is the Mecca of many an ornithological pilgrimage, for the sandhills are the breeding-place of, among other species, the Black-headed Gull (*Larus ridibundus*), the Common Tern (*Sterna fluviatilis*), and, more especially, of the Sandwich Tern (*Sterna cantianca*), which nests there in greater numbers than in any other of its very few English stations. During the summer of 1906 I was at Ravenglass from June 21st to July 13th, and, as I was on the sandhills nearly

every day, was able to make consecutive observations on the nesting habits of the birds. This advantage over anyone paying but a brief visit to the place may make my notes of some interest, and justify this paper.

The great nursery of the Terns and Black-headed Gulls, which it is convenient to refer to by the comprehensive term "gullery," is situate at the southern end of the sandhills which extend from Seascale south-eastward to the Ravenglass Estuary, where they terminate at Drigg Point. The belt of dunes is at that place about half a mile wide, and is bounded by the sea on the west, the estuary of the Irt on the east, and on the south by the channel which carries the combined waters of the three rivers to the sea. The nesting area extends for about a mile from Drigg Point in the direction of Seascale. The Black-headed Gulls nest over the whole area, but are congregated most thickly on the dunes near Drigg Point. The Terns breed as a rule in colonies, but nests of the Common Tern may be found all over the gullery, sometimes far from the chief colonies of the species. The dunes reach in places a height of from fifty to sixty, and, at one spot, of seventy feet. They are clothed with marram-grass, but between the hills are many bare, wind-swept stretches of sand, sometimes of an acre or more in extent. In places, particularly where the Gulls congregate most thickly, there are dense, rank growths of thistles and nettles, whose luxuriance in what is naturally so poor a soil is probably due to the droppings of the vast hordes of birds.* Here and there are

* A radical change in the flora of other gulleries has been commented on. Of Pilling Moss, near Fleetwood, J. D. Banister wrote (Zool. vol. iii. 1845, pp. 881-882):—"For several years past it has been remarked by persons visiting and working on Pilling Moss that the herbage of a certain portion of it, much frequented by Sea-gulls in the breeding season, had recently undergone, and more of it was yearly undergoing, a great and wonderful change. . . . The place chosen by these birds for their nidification is the most swampy that could be selected, and in its undrained state produces the least and poorest vegetation. Previous to its being selected by these birds for their breeding-ground it produced scarcely anything but a miserably stunted, unhealthy heath. This poor heath in the immediate vicinity of these birds has been almost entirely annihilated by their excrement, and in its place has sprung up a rich and varied vegetation, surpassing in verdure and luxuriance much of the cultivated land around and adjoining the Moss. The following are a few of the plants which have been introduced on this

flat grassy spaces among the dunes, where the turf is gay with patches of flowers of the common storksbill, a blue heartsease, restharrow, yellow sedum, centaury, and other plants. The Gulls, old and young, affect these open flats, where they collect in parties to rest or preen their feathers, and the Common Tern nests on them in some numbers. The birds are strictly protected, but the gullery may, by the courtesy of the owner, Lord Muncaster, be visited under certain conditions. It may be approached by a rather toilsome walk over the sandhills from Seascale or Drigg, or more conveniently from Ravenglass, whence, on production of the necessary permit, one can be ferried across the harbour.

The Black-headed Gull, the Sandwich and the Common Terns, are the dominant birds of the gullery, but many pairs of Sheld-Duck (*Tadorna cornuta*) nest in rabbit-burrows on the dunes. These Ducks, less shy than in places where they are persecuted, are often to be seen feeding in the harbour within a few yards of the village. On June 23rd some tell-tale down at the mouth of a rabbit-burrow in one of the colonies of Common Terns guided me to a clutch of eggs, but by that date the majority of the young birds had been hatched. Many broods were feeding on the mud-flats at low water, and when the tide was in followed the old birds in a straggling line as they swam from place to place. On one occasion I saw two old birds in attendance on seventeen ducklings; these belonged to two broods at least, for they were

Moss by this novel system of husbandry, and which I collected when visiting the place during the summer of 1843:—1. The meadow soft grass (*Holcus lanatus*). 2. The smooth-stalked meadow-grass (*Poa pratensis*). 3. The sweet-scented vernal grass (*Anthocanthum odoratum*). 4. The broad smooth-leaved willow-herb (*Epilobium montanum*). 5. The buttercup (*Ranunculus* —?). 6. The sorrel-dock (*Rumex acetosa*). 7. The ragged robin (*Lychnis Flos-cuculi*). Besides these I may also particularize the common rush, which now prevails so extensively on the breeding-ground as to assume the appearance of a young plantation. . . . To these I may add that nettles extensively abound, and also that the common fern is to be met with here, which latter plant is almost peculiar to a dry soil. . . . No one who formerly knew this Moss, and has witnessed the recent remarkable change, doubts for a moment that it has all been entirely effected by the dung of these birds deposited on the Moss during the breeding season; for as far as the nests of these birds have extended, and even somewhat further, the change in the herbage may be distinctly traced." . . .

not all of the same size. A few pairs of Stock-Doves (*Columba œnas*) and Wheatears (*Saxicola œnanthe*) nest in the Rabbit-burrows, and the Sky-Lark (*Alauda arvensis*) and Meadow-Pipit (*Anthus pratensis*) are moderately common. Here and there a pair of Oystercatchers (*Hæmatopus ostralegus*) nest in the gully, and this bird is extremely plentiful on the sandhills from the confines of the gully to Drigg. A few pairs nest on the shingle fringing the dunes, but the majority are on the dunes themselves. When walking across the warren I always had from six to a dozen Oystercatchers in clamorous attendance on me as I invaded their particular nesting-grounds, and at low tide the red-billed black and white birds were dotted conspicuously all over the mud-banks in the harbour. A few pairs of Lesser Terns (*Sterna minuta*) nest in company with Ringed Plovers (*Ægialitis hiaticola*) on the shingle near Drigg Point, but neither species intrudes upon the gully; and, indeed, with the exception of foraging parties of Starlings (*Sturnus vulgaris*), Rooks (*Corvus frugilegus*), and Jackdaws (*C. monedula*), I have already enumerated all the birds that I saw there. On some marshy ground between the sandhills and the Irt several pairs of Lapwings (*Vanellus vulgaris*) and Redshanks (*Totanus calidris*) had their quarters. On July 8th I saw young Redshanks which were just able to fly. For some days a pair of Lapwings with a brood of downy chicks resorted to a patch of bladder-wrack many yards below high-water mark at the mouth of the Esk, whither it was obvious that the old birds must have led the young ones across the sand each day when the tide fell.

In the latter part of June, Ravenglass is dominated by the Black-headed Gull. From the village one hears the day-long clamour of the birds on the sandhills, which, indeed, never ceases during the short midsummer nights. Old and young birds are spread all over the harbour at low water, and adults are constantly passing to and from the gully on their expeditions inland for food. They are very tame, feeding at the cottage-doors and standing in rows on the ridge-tiles of the houses in the village.* The numbers decreased daily during my stay, and at

* The familiarity of the Black-headed Gull when not molested is remarkable. During the past winter, on London Bridge, the Thames Embankment, and in St. James's Park, I have had no difficulty in inducing the birds to

the end of the first week of July there was not a tithe of the Gulls that had been on the sandhills a fortnight before. The young were then scattered over the fields in all directions, and many, both old and young, had no doubt left the neighbourhood altogether.*

My first visit to the gullery was on June 21st. Wherever I went there was a cloud of shrieking Gulls above me, and in whichever direction I looked the sandhills and shore were thickly dotted over with standing or brooding birds. The young ones—many thousands of them—were in all stages of growth, from those struggling to free themselves from the egg-shell to those which could fly well. In every bare sandy hollow there were scores of young in down, and the broad stretches of the beach were covered by them. As soon as they saw me, such as were unable to fly would scuttle away for shelter into the marram-grass and nettles, and crouch there. Nests still containing eggs—one, two, or three, principally three—were to be counted by the thousand. They were built in a variety of situations; some among the nettles and coarser herbage, but most among the marram-grass, some on the flats between the dunes, and others on their crests. In favoured sites the nests were crowded so thickly as to overlap. Marram-grass was the chief nesting material, but straw, seaweed, sticks, and other jetsam from the beach had been used in some nests, especially those on the dunes fringing the shore. The mortality in gulleries is always great, and many dead adults and more young were scattered over the whole of the nesting area.

The Sandwich Tern breeds at Ravenglass in steadily increasing numbers.† The keeper, who is constantly on the ground during

take Sprats from my fingers or head, and this in mild open weather when they would not be feeling the pinch of hunger.

* The Black-headed Gull does not nest in the Isle of Man, and is practically absent from the coast during the breeding season. By the end of June old birds—hailing perhaps from Ravenglass—had arrived in some numbers, and on the 30th I saw two birds of the year in Castletown Harbour.

† The date of the founding of the Ravenglass colony is uncertain. The pioneers probably came from Walney Island, where there was at one time a flourishing colony. In 1885 there were about seventeen pairs at Ravenglass (Macpherson and Duckworth, 'Birds of Cumberland,' p. 166).

the breeding season, stated that at least two hundred pairs nested in 1906, and his estimate was probably well within the mark, for, although by the 21st of June many of the young birds were able to fly and had left the sandhills for the shore, I counted during my stay one hundred and nine nests with eggs or newly-hatched young. The fact that there were any eggs at all at the end of the month is probably due to many of the earlier layings having been destroyed, for, in spite of efforts to protect the birds, numbers of eggs are undoubtedly taken by collectors, whose cupidity constitutes at once a breach of the law and an ill return for Lord Muncaster's confidence in allowing access to the gullery. My friend Mr. J. J. Cash, who was at Ravenglass in May, tells me that the first eggs were seen on the 4th of that month, and that on the 9th he counted fifty from one spot. On June 21st and the two following days I saw a few young birds on the sandhills which were just able to fly, but I sought in vain for birds at this stage of growth on subsequent visits. These I took to be the latest hatched of the normal May layings; they left the dunes as soon as they could fly and frequented the beach, where other young ones a few days older than they were being tended by the old birds. On July 11th I went over the whole gullery with Mr. T. A. Coward; on that date most of the belated eggs which I had seen in the fourth week of June were either hatched or chipped for hatching. There were two eggs in the majority of the nests that I examined, but a large minority had only one. On June 21st I saw two eggs and a newly-hatched bird in a nest, the only clutch of three that I came across, but this number is probably more common in the earlier layings.

The Sandwich Terns breed in colonies of from five or six to fifty pairs or more. These colonies, often at some distance from one another, are chiefly in the southern part of the gullery, and most frequently on the dunes nearest to the sea or the Irt Estuary. The nests are never on the flat areas affected by the Common Terns, but on the slopes and more often on the very summits of the dunes. In such situations they are grouped within a few inches of one another, and are sometimes in close proximity to nests of the Black-headed Gull and Common Tern. The nests are never in thick herbage, as the Gulls' nests often are, but are slight hollows in the sand among the sparse

marram-grass. Often there is no nest at all apart from the shallow depression in the sand; at times a slight nest has been sketched, so to speak, with dead bents of marram, and intermediate stages may be seen when perhaps half a dozen bents have been used. Where there are two eggs they point sometimes in the same, sometimes in opposite, directions. The eggs may be a well-matched pair or widely different in colour. Their colour range altogether is very great. The majority have a white or cream ground-colour marked with large black and brown spots and blotches. One egg had a dark brown ground heavily marked with darker brown and black; another had a pure white ground marked with fine black spots no larger than those on a Coot's egg. All the nests had excrement in their immediate vicinity; the splashy liquid fæces were almost invariably at one side, and at a distance of a few inches from the nest, and suggested that the birds when brooding always face in one direction, and that they void their fæces whilst standing in the nest. An interval, apparently of three or four days, takes place between the deposition of the eggs, for whenever I found two young birds they exhibited a marked difference in size, and I often saw an egg in a nest, and at a distance of a few inches from it a young bird a day or two old at least.

The young, as is the case with many species of Gulls and Terns, leave the nest soon after they are hatched and crouch near it. Even when very young—before the companion egg is hatched—a young bird is sometimes lying a couple of feet from the nest. At this tender age the bird makes a slight and barely noticeable depression in the sand, in which it crouches. At a latter stage of growth a narrow bed is excavated, wherein the young bird crouches with its back below the level of the sand. On June 21st I found two young birds not quite able to fly, but with the frosty grey primaries well developed. They were crouching some five or six yards apart, each in a little bed like a Rabbit-scratching, into which its body exactly fitted, its back being below the level of the surrounding sand. At a distance of a few yards it was almost impossible to distinguish them from their surroundings. I subsequently found other young ones of this age similarly crouched. Young Black-headed Gulls which I used to surprise as they were walking about sedately in the

sandy hollows always scuttled into cover, where they would crouch down, but I never saw one attempt to excavate a bed such as the young Sandwich Tern uses for concealment.

A nestling Sandwich Tern, a day old—or two at the most—which was crouching just outside a nest on June 21st, had legs and feet liver-coloured, the down of the upper parts from bill to tail greyish buff, each plumule being tipped with black; down on chin the same colour; the rest of the under parts white. Nestlings three or four days older than this had legs and toes greenish black, with dull vermilion webs; bill dull vermilion, with blackish tip. A young bird which had acquired its first plumage, but was still unable to fly, had the feathers of the head from bill to nape greyish buff, finely barred with black, those of the mantle broadly barred with pale buff and black, a broad white collar on the neck; the white breast and belly were suffused with a pale pink tinge; the chin was white, but a trace of the greyish-buff colour of that region in the nestling persisted in the form of an ill-defined torque of grey down on the fore neck; the primaries and wing-coverts were frosty grey, each primary being tipped and margined on the inner web with a narrow band of white; the rump was white, a few of the feathers being barred with pale buff and black; legs and feet dark lead-colour; bill yellowish horn; tongue and inside of mouth lemon-yellow. Two others, a little older than the one from which this description was taken, had lost all trace of the ill-defined torque on the fore neck, and had black bills which already showed signs of the yellow tip that characterises mature birds.

When ejected from the little beds which they hollow in the sand young birds not quite able to fly ran along the ground with wings outstretched. Their wings, however, sooner or later caused them to get entangled in the marram-grass, where they were readily recaptured. The young Black-headed Gulls, though they sometimes raised their wings, never ran with them widely spread, and consequently got through the marram-grass and into cover much more quickly than the Terns.

On the nesting-ground one has good opportunities of comparing the appearance of the Common and Sandwich Terns as they fly overhead in a clamouring cloud with the Black-headed Gulls. The tail of the Sandwich is, compared with that of the

Common Tern, very short, the wings are longer and narrower, and the bird of course appears much larger altogether. The rosy tinge on the under parts is only noticeable at all in a favourable light. By June 21st many of the birds were already losing their full nuptial plumage, and showed white feathers on the forehead, but the extent of the white differed with the individual. The birds, calling excitedly, often dashed down to within a few inches of my head. The Common Terns never showed the same temerity, even when I was handling their young ones.

At high water the Sandwich Terns were often to be seen fishing in the harbour, not in parties as the Common Terns frequently were, but singly or in twos and threes. They flew to and fro above the feeding-place at a height of from twenty to forty feet, but I never saw one hover as the Common Tern does. The tail is fanned out but not depressed. The wings are half-closed, and the body makes a half-turn during the oblique forward plunge to the water. Total submergence seems nearly always to take place, and the period of submergence is markedly longer than with the Common Tern; occasionally, however, the wings show above the surface, and the body only is submerged.

The call-note, audible at a considerable distance, is a loud, grating "kirr-whit." I often heard this note when the birds were fishing in the harbour, but never on the nesting-grounds. There I only heard the alarm-note, which was plainly distinguishable in the babel of the Black-headed Gulls' and Common Terns' voices. It varies from "gwit" to "gwut," a sharp note repeated several times. The young in eggs which were chipping uttered a feeble "gwit," a mere whisper of the loud cry of the adults.

The Sandwich Terns flying overhead at the nesting-ground often had a Sand-eel (*Ammodytes*) dangling from their bills. A young bird which I captured disgorged about three inches of the tail-end of one of these fishes, partly digested. On July 11th, at the side of a nest, I saw a Sand-eel, a Sprat (*Clupea sprattus*), and a small Weever (*Trachinus*).

The Common Tern nests sporadically in all parts of the gullery, but congregates in large colonies on three flat areas

among the sandhills, one of about fifteen, the other two of perhaps ten acres each. Here there were hundreds of nests on the short turf, often in close proximity to one another. On June 22nd, the date of my first visit to these open plains, I found nests with one, two, or three eggs, the last number being the most usual. The eggs in the same nest generally, though not invariably, approximate in colour. The nests on the turf were fairly substantial structures of bents,* but on the tops of the dunes they were usually mere shallow depressions in the sand with a few bents laid across them, the eggs not necessarily being on these bents at all. When one invades their nesting-ground the birds fly overhead, calling plaintively "pierre" and "peerah," but they never dash down at the intruder's head as the Sandwich Terns do. The brooding birds rise from their nests and join their clamorous fellows; they do not fly in an ordered flock, but drift to and fro at varying heights, each on its own course, the crowd being always densest just over the intruder, and they settle down again on the nests as soon as he passes on.

On June 28th I saw the first young one, in a nest with two unhatched eggs. By July 5th most of the eggs were hatched. They are hatched, apparently, at intervals, for in many instances I noticed a discrepancy in the size of the young, and in others that one young bird had been hatched whilst one or two eggs still remained in the nest unchipped. The young leave the nest soon after they are hatched, and squat on the turf or in the grass close by, but even when the nests were on the bare sandhills I never saw any attempt on their part to hollow out a little bed such as the young Sandwich makes, though, it is true, I did not see any Common Terns of the same age as the Sandwich Terns which made the deepest excavations.

The nestling Common Tern is clothed in soft down, golden-brown, spotted and streaked with black on the dorsal surface, pure white beneath; the chin and sides of face below the bill are sooty-black; legs and feet pink; bill pink, with a brownish-black tip, at the extremity of which, in all the birds I saw, a white egg-tooth still persisted.

* The nesting material is, of course, to some extent dependent on local circumstance. In Anglesea I have seen nests made exclusively of rabbit-bones or crab-shells.

A high death-rate always obtains among young birds, but the Common Terns were subject to an extraordinary mortality. I saw many dead nestlings on the breeding-grounds prior to July 11th, but on that date their bodies might have been counted by hundreds. I cannot account for this exceptional death-roll, but if it was caused by an epidemic the nestlings alone were affected, for no dead adults were to be seen.

When visiting the chief breeding-grounds of the Common Tern a curious habit, which is common to other Terns, was frequently forced upon my notice. Suddenly, without apparent reason, the clamour of all the birds over a wide area would cease; the babel of many voices was succeeded by an uncanny hush as those birds which were sitting or standing beside their brooding mates, actuated by a common impulse, rose, and, joining those which were hovering in the air above them, swept in a close grey mob low over the ground to the verge of the dunes. In a few seconds the birds returned and distributed themselves over the nesting-ground again, and the weird silence gave place once more to the customary hubbub.*

Single birds often fished in the harbour, and as the tide was falling one or two were generally to be seen capturing Sprats in the pool of a fish-garth near the mouth of the Esk. At times the birds would pack in a close flock above a shoal of fish at the river mouth. Whenever a bird made a successful plunge and rose with what looked like a small Sprat in its bill, it would make off towards the sandhills, whence others were coming to join in the hunt. When fishing this bird often utters a sharp "kitt, kitt," and sometimes "kierie," notes very different from the "pierre" and "pee-rah" of alarm. In feeding the young bird the parent sometimes alights on the ground beside it, and at others hovers immediately above it, and puts the fish into its gaping mouth.

When fishing the Common Tern hovers at a height of from ten to fifteen feet above the water, with rapidly vibrating wings, tail depressed and fanned out, and bill pointing downwards. Then it plunges obliquely forward, headlong to the water, sometimes submerging itself entirely, sometimes all but the wings,

* For an account of a similar habit in the Arctic Tern, see Zool. 1906, p. 96.

and sometimes picking up food from the surface without submergence. In the downward plunge the wings are half-closed, and the body makes a half-turn, but this twist is not so pronounced as that made by a diving Gannet.*

The Common and Sandwich Terns share, with Gulls, a partiality for bathing in fresh water. In the harbour both species might be seen swimming and bathing in the fresh water which came down the rivers at low tide.

The fishermen aver that the Common Terns often kill birds which trespass on their breeding-grounds.† I saw several young Black-headed Gulls—birds well able to fly—lying dead in places where the Terns' nests were numerous. One or two which I skinned had blood-stained spots on the occiput and hind neck such as might have been caused by strokes of the Terns' bills. Joseph Farren, the old boatman, assured me that he once saw a crowd of Terns mob and kill a pair of Partridges which with their brood had strayed into the Terns' nesting-ground. Dr. Cass, of Ravenglass, to whom he took the birds, told me that on skinning them he found blood-stained spots on the heads and necks, which appeared to confirm Farren's story.

Lesser Terns—miracles of buoyant grace—resorted to the river-channels and the shallow water of the harbour to feed. When hovering this species has the tail widely spread and depressed; the wings are vibrated much more rapidly than are those of the Common Tern, a character which is very striking when the two species are seen together. The young of the Lesser Tern are as precociously active as those of its congeners. I found a tiny nestling crouching on the shingle eighteen inches from a nest which held a chipped egg. The upper surface of the little

* Other tactics are sometimes adopted. For an hour or more on July 22nd, 1906, I watched a Common Tern feeding at Tatton Mere, Cheshire. The bird never plunged into the water, but beat up and down the mere, never rising more than five or six feet above the surface. It progressed in a series of long low curves, and when at the lowest suddenly bent its head and picked up something from the water with its bill, which during flight was carried in the same line as its body, and not at right angles to it as it is when a Tern hovers just before plunging into the water.

† In Anglesea I have seen Common Terns combine to harry both Herring and Black-backed Gulls, and chase them discomfited from the vicinity of their nests.

creature, yellowish buff with black spots and stripes, harmonized very closely with the shingle; indeed, the young of this Tern are even more difficult to distinguish from their surroundings than are the eggs. The feet and legs of this nestling were of a delicate shrimp-pink colour.

Apart from those that nest in the immediate vicinity, not many species of birds frequent the estuaries at midsummer. Herring-Gulls (*Larus argentatus*)—chiefly immature birds—were always about the harbour, and on June 23rd I saw an adult Lesser Black-back (*L. fuscus*). Two Greater Black-backs (*L. marinus*)—birds in immature dress, with black tail-bars—haunted the harbour, where they often associated with the Herring-Gulls. One morning I watched a Herring-Gull tearing at the entrails of a dead Dog on the shore. Within a foot or two of it stood an old Rook and two young ones, obviously afraid to venture nearer, but as soon as the Gull flew away gorged they hurried to the feast.

There is a heronry at Muncaster, and at low tide Herons fish in the shallow pools, sometimes close to the village. Of wading birds, which no doubt are plentiful at the seasons of migration, I saw, with the exception of an occasional Curlew (*Numenius arquatus*), almost nothing. On June 28th there was a single Dunlin (*Tringa alpina*)—a black-bellied bird—feeding with three Ringed Plovers. On July 8th I saw two, and on the 10th a flock of forty-one, mostly, at any rate, adult birds in summer dress. These were, doubtless, the vanguard of the birds which had nested on the fells, or possibly in some district further north. The Common Sandpiper (*Totanus hypoleucus*) was abundant on the rivers above the railway, where, judging from their noisy demonstrations, several pairs were nesting on the tidal portions of the streams. It was not, however, until July 4th that I saw a Sandpiper in the harbour; from that date they became daily more numerous on the mud-flats and in the gutters.

NOTES AT AVIGNON (APRIL 2ND-11TH, 1908).

BY W. WARDE FOWLER, M.A.

AVIGNON, being on the Lower Rhone and but a short distance from the apex of its delta, should be an excellent place for observing the passage of birds from the Mediterranean into France in early April: the more so, as the Rhone there flows in two channels enclosing a flat alluvial island at least two miles long, which is full of excellent cover, as well as of cultivated land. Unfortunately the place is liable to be continually swept from the north-west by that invigorating but uncomfortable wind, the Mistral, which blew with more or less violence the whole time I was there, and this may partly account for the curiously negative results of my daily investigations. "La chasse," the favourite amusement of the Provençal bourgeois, cannot explain this, for no one was shooting during my stay, though it doubtless explains the extraordinary paucity of resident birds, of which I saw no more than a few Crested Larks on the high ground, and here and there some Tits (Great and Marsh, for the most part), with one or two Creepers, a Kestrel, a Reed-Bunting, and a solitary Blackbird.

As I was at Avignon and Nismes in 1895, from April 7th to 12th, and have a diary of those days, I combine the two records in this brief paper. They tally almost exactly in every particular, except that on the 12th in my earlier visit, which was a very hot day, there seemed to be distinct signs of a rush of migrants. On the whole it would seem that migration on the Lower Rhone is hardly more forward in early April than with us in England.

On my arrival on the 2nd, as in 1895, I at once heard the Blackcap's song, and with this I had to be content during my whole stay, for no other bird sang either regularly or wholeheartedly. But the Blackcap was to be found in every bit of cover on the island, and also on the heights, and, as its numbers

seemed always about the same, I have no doubt that it should be classed as a resident. That it spends the winter in some parts of France seems to be certain, and it is of course the fact that it not unfrequently does so even in Britain. On the 10th a young Englishman, attached to the Lycée as teacher of English, showed me a deserted nest with one Blackcap's egg in it of the yellowish-brown type, built in a most conspicuous place close to a tennis-ground and a dusty high road. Two French boys who were with him did not seem to take much interest in it. The Avignonese do not seem devoted to natural history; their Museum, excellent in other ways, contains hardly any birds. I may just add that these Blackcaps would sing even in a violent Mistral, and that their song was of a slightly different type to that of our birds—less pure in tone, as I thought, and less sustained.

A few Swallows were fighting their way up the river on the morning of the 2nd, and during my stay their numbers slowly increased; before I left some seemed to have reached their summer quarters here, for they were flying about one or two houses on the west side of the Rhone. I saw no House-Martins or Sand-Martins. In 1895 I met with these two species for the first time at Bordighera on April 13th and 14th. respectively. The Common Swift, which I did not see this year at all, was in the former year passing eastwards along the coast of the Riviera on April 14th at almost incredible speed. I saw it again at Milan on the 24th, and in Northern France on May 1st.

On the 3rd I strolled to the southern end of the island, where the two branches of the river unite to form a truly magnificent stream. I saw nothing new except a party of Terns going northwards, and had (as often afterwards) to console myself with the butterflies, of which I will say a word when I have done with the birds.

On the 4th we went to the historical town of Orange. Here, while I was examining the sculptures on the Roman arch through my binocular, I caught sight of a large Swift travelling northwards, and as the glass was in position I was able to identify it as *Cypselus melba* by its white belly. In 1895 this fine bird was passing Avignon on the 8th. The next day I saw another party from the top of the amphitheatre at Nismes, and it would seem that this is its regular course of migration on its way to the

mountains of Savoy, the Jura, and the Vosges. Whether those that breed in the Central Alps also come this way I cannot say. At Bordighera, in 1895, they were travelling eastwards along the coast on April 19th. This year, on the 8th, another party passed over us at Avignon. While almost all the smaller migrants seemed to be behind their time this year, the Swallows and Alpine Swifts were able to disregard the Mistral, which was not only strong but sometimes extremely cold. At Orange I saw no other migrants, and our zoological experience was limited to a dish of Roman Snails (*Helix pomatia*), very appropriately offered us for lunch in this ancient Roman town. Luckily they were not the only item on the *menu*.

The 5th and 6th were extremely cold, with very strong wind, and I searched in vain for anything fresh. On the 7th I found a Willow-Wren at last in the island, and on the 8th I came on one or two more; these were quite silent, and it was not till the 10th that I heard the familiar song, only once or twice repeated. The silence of all the birds was most striking to an Englishman; the Blackcap alone seemed quite at home and comfortable. I did not meet with the Chiffchaff until the 13th, when we had moved to Lausanne. The Nightingales began to arrive this week, the first appearing on the 4th, but all they did in the way of song was to break out now and again with a few harsh loud notes, as if the Mistral disagreed with their vocal organs. In 1895, on a hot day (the 11th), they were settling down to sing at leisure. The Garden-Warbler was here on the 10th, and in song, and on the 8th in 1895. An *Acrocephalus* of some kind seemed to be lurking in an osier-bed on the 8th, but slipped away silently before I could identify it.

For the Yellow Wagtails I was a little too early, though I saw one with a very dark head by the Lake of Geneva on the 13th. The various forms of this species seem to cross the Mediterranean for Central Europe in the second and third weeks of April; at Gibraltar, as Colonel Irby tells us, their passage begins earlier, and lasts from Feb. 20th to April 20th. At Avignon, in 1895, they did not appear till the 12th, when *M. flava* was in considerable numbers in the island; at Aigues Mortes, near the mouths of the Rhone, I had seen *M. cinereicapilla* two days earlier, and at Bordighera on the 14th they

were arriving from the sea in great numbers, and in a variety of plumage that was quite bewildering. Again, in 1905, as I was crossing from Sicily to Greece in the 'Argonaut,' they were continually dropping on the deck on April 16th, while on our return voyage at the end of the month only a single specimen visited us.

I have now mentioned all the migrants I was able to see at Avignon this year; on my former visit I was able to add, on the 12th, the Common Sandpiper, a few Whitethroats, and a single Spotted Flycatcher. But this spring of 1908 seems to be everywhere an exceptional one; I have this afternoon (April 17th) had the unique experience of strolling for some three hours in fields and woods of Oxfordshire without seeing or hearing a single summer migrant.

I may just add that Avignon should be a good place for collectors of Lepidoptera. Among the butterflies I met with in sunny spots, chiefly on higher ground among olives and vines and on the walls of gardens, were the Camberwell Beauty, the larger Swallow-tail, Brimstones (all with the deep orange on the upper wings, which is characteristic in the South of Europe), the Clouded Yellow, Large Tortoiseshell, Green Hairstreak, Small Copper, Bedford Blue, Marbled White, and what appeared to me to be a Comma. Perhaps the most abundant insect was the Humming-bird Moth; in fifty years in England I have not seen so many as I saw in five days at Avignon and Orange. When we see them in this country they are hovering about our garden flowers, but there they were in greatest numbers about sunny stone walls, where assuredly no nutriment was to be had. Whether they were simply enjoying the warmth, or what they were doing, I must leave to entomologists to decide.

THE MAMMALS OF SURREY.

BY GORDON DALGLIESH.

BEFORE I wrote the following list of Surrey mammals I had the possibility in view of a county fauna. The birds have been well treated by Messrs. Bucknill, Bentham, and Mouritz, but the mammals have been somewhat neglected. The list may prove useful to any future worker on the county fauna, as the species are all collected in one paper, and references have been made to any important scattered notes treating of these in the back numbers of 'The Zoologist.' The mammals mentioned are those I have personally come across, with one exception, *viz.* the Pine Marten.

LONG-EARED BAT (*Plecotus auritus*).—This species is fairly common and well distributed throughout the county. I caught a specimen in my bedroom at Witley at 12 p.m. on Dec. 1st, 1907. It showed no signs of torpidity, but on the contrary was very lively. It was a female of great beauty, the fur being exceedingly long and soft. One I watched on a summer's evening was flying round and round a hawthorn bush, catching large moths. It first hovered over its prey, then captured with a swift downward plunge. I have always found it a solitary species.

BARBASTELLE (*Synotus barbastellus*).—Once seen by myself at Witley (Zool. 1907, p. 299).

NOCTULE BAT (*Pterygistes noctula*).—Very common, and always makes its appearance during the first week in April.

PIPISTRELLE (*Vesperugo pipistrellus*).—To be seen on the wing throughout the year except in very severe and cold weather.

DAUBENTON'S BAT (*Myotis daubentoni*).—I have seen numbers of this species on the Thames by Richmond Bridge, and over the lakes in Lea Park at Witley.

NATTERER'S BAT (*M. nattereri*).—One taken by myself in a bedroom at Milford in July, 1902.

WHISKERED BAT (*M. mystacinus*).—On April 2nd this year (1908), at about 6.30 p.m., I saw a Bat fly from a farm-building in the village of Brook, near Witley. It at once aroused my attention as a species I was not familiar with, and every evening it made its appearance at the same time almost to the minute. On the evening of the 8th I shot it, and it proved to be the above species. This is as far as I know the first record for Surrey. Its flight closely resembled that of a Pipistrelle, only not so swift and without so much of the numerous twists and turnings peculiar to that species. It confined itself to a given area, flying round this with due regularity, and it frequently dipped on the surface of a duck-pond. The specimen was a male, and apparently the only one of its species about. It made a shrill and sharp squeak at intervals, which was audible some way off.

HEDGEHOG (*Erinaceus europæus*).—Found in suitable places everywhere, approaching very close to the Metropolis, as I heard of one taken in a garden at Dulwich.

MOLE (*Talpa europæa*).—Abundant, especially so in the parish of Witley, occurring in such numbers that over a thousand were caught in a few months in a one-acre field. The question has often arisen: Are Moles beneficial to the agriculturist or not? On my questioning a gentleman farmer on the subject he kindly gave me the following information:—"Moles come after the wireworm, and in themselves do good. In fields where this pest is not found Moles also are absent or very scarce. Did the Mole not raise heaps of earth it would unquestionably be of great service to the farmer, but the Mole-heaps damage the grass, and in some places kill it quite off. The question now arises: which is the more harmful, the Mole or the wireworm? One spot I knew of, a road divided two fields; in the one Moles and wireworms were abundant, in the other neither were found. It would be interesting to know the reason of this. The two fields to all intents and purposes were identical, both producing grass-crops. A good dressing for a field infested with wireworms, I am told, is a mixture of basic slag and salt, destroying the wireworms, and hence keeping the Mole away." Mr. Bentham kindly sent me the following note:—"During August last (1907),

when with Mr. Mouritz, I detected a small black object running about close to the water's edge at Frensham Little Pond, and on examination with our glasses this proved to be a Mole. On arriving at the place we were greatly surprised to find that the Mole had taken to the water and was swimming about in quite an energetic manner. This continued for perhaps five or ten minutes, and I was just making ready to photograph the creature in the act of swimming when we discovered that it had drowned itself." I have frequently found living Moles above ground infested with blowfly eggs. These Moles were, I have no doubt, sickly, and would have died shortly. After a severe frost Moles



WATER, COMMON, AND LESSER SHREWS, TO SHOW RELATIVE SIZES
(reading from left to right).

come to the surface more frequently than at any other time. I have seen a few white county examples, and have a specimen from Reigate.

COMMON SHREW (*Sorex araneus*).—Abundant. During the rutting season in April the glands that secrete the strong musky odour are very conspicuous in the shape of stiff hairs on the sides of the body near the fore limbs.

LESSER SHREW (*S. minutus*).—Recorded from Puttenham and

Witley (Zool. 1906, p. 171), Elstead and Hindhead (L. B. Mouritz *in lit.*). On Jan. 20th this year (1908) I trapped a female on a night of severe frost. It is probably quite common throughout the county, but on account of its small size often escapes detection.

WATER SHREW (*Neomys fodiens*).—I have always found this species decidedly rare, and only know of two places where it is to be found in anything like abundance, namely, Esher and Milford. In the latter place I have frequently seen dead specimens on the road a long way from water, and it shares in the autumnal mortality with the Common Shrew. At Esher numbers took up their abode by a small and sluggish stream verging on the outskirts of a pine-wood, and here many were trapped.

FOX (*Canis vulpes*).—Common in the south-west portion of the county, rarer towards the Metropolis, and is occasionally found within the confines of Richmond Park.

PINE MARTEN (*Mustela martes*).—(Cf. Zool. *ante*, p. 5.)

POLECAT (*Putorius fœtidus*).—As far as I am aware the Polecat has been completely exterminated in Surrey. I purchased a stuffed specimen from Braddon, the Guildford taxidermist, taken in the neighbourhood of Guildford sixteen years ago. I remember when I was quite a child in 1887, being shown two dead ones just killed by a gamekeeper in Milford. Of course there is just the probability of its turning up again in the wilder parts of the county. It is curious why the Polecat and Marten have been so completely exterminated from most English counties, and yet the Stoat and Weasel, in spite of the constant warfare waged against them by gamekeepers, run unchecked.

STOAT (*P. ermineus*).—Abundant. I have seen several white and pied county specimens, and I once had a nearly pure white one from Pirbright. Last winter (1907), when out rabbit-shooting, and while waiting for the ferrets to work, I was surprised at a rabbit bolting from a hole almost under my feet some distance away from where the ferrets had been put in. I shot it, and just after out popped a second, and yet a third, both of which I secured; and, lastly, out came a Stoat hot on the scent. I was in the hopes it would turn out more rabbits, but

it ran off on catching sight of me, and I did not see it again. Ferrets when working a "bury" frequently kill a Stoat intent on the same purpose as themselves.

WEASEL (*P. vulgaris*).—As common as the last. I have found suckling young in June.

BADGER (*Meles taxus*).—In spite of persecution still holds its own in some of the wilder portions of the county, and a year seldom passes without one or more making their appearance in the county taxidermists' shops.

OTTER (*Lutra vulgaris*).—Found sparingly on the River Wey, and occasionally putting in an appearance on Frensham Great Pond.

SQUIRREL (*Sciurus vulgaris*).—Throughout the wooded districts right into the confines of the Metropolis itself. For the rearing of young Squirrels by hand I would recommend warm diluted milk, given in a fountain-pen "filler," with a short bit of bicycle rubber-tubing attached to the end.

DORMOUSE (*Muscardinus avellanarius*).—Decidedly on the decrease, and only now found in the wilder parts of the county. I have met with many of their nests when out Pheasant-shooting in November and December. The Dormouse is an arrant robber of birds' eggs.

HARVEST MOUSE (*Mus minutus*).—I only know of one place in the county where this pretty little Mouse may be found with any certainty, viz. the village of Eashing, near Godalming.

WOOD MOUSE (*M. sylvaticus*).—Only too common, and a sad pest in gardens. I have seen whole beds of crocus-blooms completely destroyed by this tiresome little rodent. I once trapped a specimen that was blind in both eyes.

YELLOW-NECKED MOUSE (*M. flavicollis*).—Recorded from Richmond and Witley (Dalglish), Churt (Dent), and I have seen a specimen taken at Kew. In the parish of Witley this fine Mouse is very common, and I have trapped numbers here in the garden at Brook.

HOUSE MOUSE (*M. musculus*).—I caught a very pretty cream variety of this species last August (1907) in a farm-building.

BLACK RAT (*M. rattus*).—Personally, I have only seen one county specimen, which was formerly in my possession, from Oxted.

BROWN RAT (*M. decumanus*).—A club has been formed at Witley for the destruction of this pest, a penny per tail of an adult Rat being paid. I have seen one or two melanic examples. One in the Haslemere Museum is wrongly labelled “Black Rat.”

COMMON FIELD VOLE (*Microtus agrestis*).—Common everywhere.



YELLOW-NECKED MOUSE AND WOOD MOUSE, TO SHOW RELATIVE SIZES
(reading from left to right).

BANK VOLE (*M. glareolus*).—At one time this Vole was considered something of a rarity, but it is in reality one of the commonest of mammals—at least as far as Surrey is concerned. There seems to exist a good deal of confusion in the discrimination of this Vole and the above species, which has probably led to its being overlooked. A simple key to the two is as follows:—Tail very short; under parts grey = *M. agrestis*. Tail

moderate, tipped white; under parts suffused with faint yellow = *M. glareolus*.

WATER VOLE (*M. amphibius*). — Common everywhere by side of pond, lake, and stream. A large male taken at Thursley measured, in millimetres: Head and body, 192; tail, 129; hind foot, 36; ear, 17.

COMMON HARE (*Lepus europæus*).—Common in many parts. I once caught a leveret in the middle of some pine-woods.

RABBIT (*L. cuniculus*).—Only too common. Melanic specimens are not uncommon round Witley. I have seen a pure white county example on show in Mr. Braddon's shop in Guildford, which was captured near Godalming. Mr. Mouritz kindly gave me the skull of a Rabbit with malformed incisors, the lower teeth being very long and growing upwards, the upper being bent towards the left.

NOTES FROM LAKELAND, CUMBERLAND AND WESTMORLAND, 1905.

BY T. C. PARKER.

(Concluded from p. 150.)

JUNE.

3rd.—Buzzard's nest, two young, Lake District (W. E. B. Dunlop).

5th.—Great Spotted Woodpecker's nest with young near Carlisle (J. B. Cairns).

15th.—Single Wild Swan seen on the Solway (W. Nichol).

[The arrival of the Nightjar in this district (Salkeld) seems to have been considerably delayed this season, though when they did come I think there was a greater influx than usual. A nest of this species was reported to me from near Lazonby during the last week of the month. The Land-Rail and Spotted Flycatcher have been very scarce, very few pairs having arrived. I have seen two batches of young Kingfishers on the Eden Bank. They were flying strongly by the middle of the month. This handsome bird does not seem to increase to any extent, notwithstanding the protection afforded it. Probably its pugnacious disposition has something to do with this (H. Britten).]

JULY.

[During the month the Rooks have been very troublesome among the turnips and potatoes; also the Peewits have done some harm to the turnips, pecking in by the side of the plants, and have allowed the sun to get at the roots and dry them off. I have also seen where Blackbirds and Thrushes have done the same thing. This is the first time I have ever noticed these latter birds doing any damage to the turnip-crops (H. Britten).]

AUGUST.

11th.—A Water-Shrew seen at Rickerby (W. H. Little).

[All the summer migrants are flocking; Salkeld Dykes (H. Britten).]

SEPTEMBER.

10th. — A Spotted Redshank on Skinburness Marsh (W. Nichol).

12th.—A Common Buzzard flying over Carlisle (T. L. Johnston). A Short-eared Owl in a clump of willow-bushes on River Eden, near Nunwick (H. Britten). [This is only the second time I have met with this useful bird in this district, the first occasion being in 1896, when I saw a bird in the Old Eden in October (H. Britten).] Storm-Petrel seen near the lightship off Silloth (W. Nichol).

15th.—Barnacle Geese arrived at Ruthwell (G. H. Carr).

16th.—Five Grey Geese (probably Pink-footed) and thirty Barnacle Geese seen on Long Newton Marsh (T. L. Johnston). [Cf. Zool. 1905, p. 392.]

18th.—A Black Tern in immature plumage seen on Skinburness Marsh (W. Nichol).

21st.—A Spotted Redshank seen, probably the same bird as previously reported (W. Nichol).

[28th.—An immature Wigeon was shot on the Eden near Salkeld. I have never met with this Duck previously on River Eden (H. Britten).]

OCTOBER.

[1st.—A large flock of Wild Geese was seen passing up the Eden Valley in south-east direction. Also other flocks have been seen at different times during the month. The easterly movement is, from my own personal observations, earlier this season than usual (H. Britten).]

5th.—Five Bean-Geese seen, Skinburness (W. Nichol). [The Jack-Snipe made its appearance at Great Salkeld; a number seen together. Also others at intervals since that date (H. Britten).]

13th.—Redwings arrived at Nunwick (H. Britten). [On this date the last of the Swallows and House-Martins left; Salkeld Dykes (H. Britten).]

14th.—Hooded Crow seen at Orton (T. L. Johnston).

16th.—Fieldfares arrived at Nunwick (H. Britten). Four Swallows on River Eden at Edentown (D. L. Thorpe).

[A fine specimen of the Buzzard was seen in the Eden Valley

early in the month, and I am told that a pair of these fine birds have been seen regularly up the Briggie Beck by Langwathby for the last five or six weeks (H. Britten).]

24th.—About twenty Wild Swans flew down the Solway (W. Nichol).

27th.—Swallows still at Etterby Scaur (D. L. Thorpe).

29th.—A large flock of Barnacle Geese passed over Carlisle, low down (T. L. Johnston).

During October some Wigeon were on the River Eden near Nunwick (H. Britten).

[The Kingfishers are conspicuous in the Eden Valley at the present time, their numbers having been considerably increased by the birds which have been nesting on the banks of our smaller becks, and as these birds are naturally of a quarrelsome disposition, this has led to vigorous battles, often carried on high in the air, accompanied by a great amount of shrill screaming. The occasional glimpses of the brilliant blue backs and chestnut breasts of the birds as they dart about is a charming sight. I have often watched these birds as they sat on some favourite perch, waiting and watching for a luckless Minnow to appear within reach of a swift dash into the water, and it is very rarely that I have seen them miss their prey. This season I have seen them hovering over the shallows of the Eden, a habit I have never seen them do before, though, of course, both read and heard about it. They hover about six to seven feet above the water, and are perfectly motionless as regards horizontal and perpendicular movement, but the wings vibrate with great rapidity. I several times saw these birds hovering so that I had an extensive reach of the river behind them as a background, and found, though the sun was shining brightly, that their colours harmonized so perfectly with the water that they were almost invisible. This gave me the idea that possibly, to the fish below, their colours would blend in the same way with the sky, and so render them invisible to their prey. After several failures I at last succeeded in getting one of these birds between me and the bright sunny blue sky, and, although I was within a dozen yards of the hovering bird, it was very difficult to see. I could see it a great deal easier when it was changing its position, but as soon as it hovered the chestnut and blue seemed to blend

together, and the rapidly beating wings seemed to make the bird appear quite hazy to the view (H. Britten).]

NOVEMBER.

9th.—A Greenshank seen on Burgh Marsh (L. E. Hope).

12th and 13th.—A Swallow seen at Nunwick (H. Britten). [This bird was seen by a number of people at Nunwick Hall. The only other occasion on which I can remember a Swallow occurring here during this month was in 1896, when a bird was seen flying round Nunwick on Nov. 7th, the ground being covered by a heavy fall of snow (H. Britten).]

16th.—The Whooper Swan returned to the Eden and rejoined the Mute Swans, in full mature dress (*cf.* Zool. 1906, p. 193).

21st.—A pair of Velvet Scoters frequenting the Solway, near Silloth (W. Nichol).

[Ravens have been seen on a number of occasions passing high overhead from one range of hills to the other (*i. e.* Lake District to the Cheviots); Salkeld Dykes (H. Britten).]

DECEMBER.

12th.—A brood of Starlings hatched in a barn-wall at Workington (G. W. Müller).

26th.—A large flock of Bramblings seen at Lingey Close Head (B. Johnston).

28th.—A Kestrel was found dead in a tree at Windermere, having caught its head in the fork of a branch and hanged itself (W. E. B. Dunlop). Great Spotted Woodpecker seen at Windermere (W. E. B. Dunlop).

[Kestrels seem to be rather more plentiful again this winter at Salkeld (H. Britten).]

[In connection with this paper a letter from two correspondents appears at p. 192.—ED.]

NOTES AND QUERIES.

MAMMALIA.

Gregarian Occurrence of the Water Shrew (*Sorex fodiens*) in Yorkshire.—Between six and seven o'clock in the evening of May 10th, 1907, I was attracted by an unusual agitation of the water in a wide ditch or long narrow pond skirting the eastern margin of a plantation at Ackworth, and communicating with the River Went, a small stream more or less polluted with sewage. The weather was fairly warm, and there had been rain, accompanied by thunder and lightning, during the day. Standing at the edge of the pond for half an hour or more I had the good fortune to see twenty or thirty Water Shrews disporting in the water. They were chasing one another in amorous play, and they kept up a squeaking chorus. When swimming on the surface of the water they had a wriggling motion, caused by the alternate action of the hind feet. Several left the water and ran on the bank of the pond, some of them coming within a few inches of my feet. When I stirred or made a noise those on the bank instantly plunged into the water out of sight, and those in the act of swimming or running on the weeds floating on the water immediately dived, but they only disappeared for a few brief moments, coming up again and continuing their frolics. The colour of the upper parts ranged from velvety black to brown and grey, and in some of them, when swimming, the white of the belly was projected so as to present a narrow line, giving the appearance of a white fringe along either side. Although I frequently visited the spot and its neighbourhood before and since this interesting exhibition—and I was there on several evenings immediately succeeding that of the occurrence related—I have only occasionally noticed single examples, none of which were at the spot where I observed the party.—WALTER B. ARUNDEL (High Ackworth, Pontefract).

Common Shrew in Skye.—On Sept. 18th, 1907, I had the good fortune to trap a female *Sorex araneus* below the garden of the hotel at Sligachan, Skye. I have delayed in writing this note as I have been away from home and desired to enclose its measurements to ensure the correctness of my identification. These measurements, taken on

the British Museum standard and compared with those of four specimens from Glenelg on the coast just opposite Skye, are as follows:—

Locality.	Sex.	Head and Body.	Tail.	Ear.	Hind Foot.
Sligachan.....	♀	68·5	42	7·5	12·5
Glenelg.....	♀	69	40	9	12
„	♀	72	43	9	13
„	♀	78	40	7	13
„	♂	65	39	9	12

The Glenelg specimens are interesting as showing the extreme west limit of *S. araneus* on the mainland. Glenelg is opposite Skye, where the Channel is narrowest. The dentition of the Skye specimen also agreed with that of *S. araneus*.—P. A. BUXTON (32, Great Cumberland Place, London, W.).

White Water Vole.—On April 27th a man lopping trees near the water-mill at Little Glemham, Suffolk, killed an albino Water Vole (*Arvicola amphibius*). The fur was of the purest white all over, long, soft, abundant, and shining; the eyes red. It was a young animal, about three parts grown, and must, I think, have been born last autumn.—G. T. ROPE (Blaxhall, Suffolk).

AVES.

Mimicking Song of Chiffchaff.—I have been watching a Chiffchaff here for some days which almost invariably concludes its normal song of “chiffchaff” with an exact reproduction of the song of the Willow-Wren. There is no interval between the two songs, the “chiffchaff” part always coming first. One would hardly expect to meet with mimicry in a Chiffchaff, if such it should be—or is there any other possible explanation of its having the song of the two species? This bird arrived and commenced its song as above described before I could find any Willow-Wrens about.—H. MEYRICK (Hampstead).

The Great Black Woodpecker.—On several occasions I asked readers of ‘The Zoologist’ to let me know if they could trace a loud melodious cry which I frequently heard when at Schinznach, near Basel, and also at Strassburg, &c. I wish now to say that I feel assured it proceeds from the Great Black Woodpecker (*Picus martius*), as I heard it last July at Helenen, above St. Nicolaus, in the Zermatt Valley, and was assured that the “specht” there was the “schwarzer.” I heard it first years ago at the Signal Hill at Belveden, near Bex (Vaud), and immediately afterwards saw the bird, “like a chicken,” flapping with rapid beats of the wing from tree to tree. The note

reminded me somewhat of that of the Whimbrel.—CHARLES W. BENSON (Bedford House, Balbriggan).

Peregrine Falcon in Norfolk.—I have much pleasure in recording a fine female Peregrine Falcon (*Falco peregrinus*) in full adult plumage; weight just over two pounds nine ounces. It was shot at East Harling, Norfolk, by Mr. Frank Claxton, on February 5th last, and sent to me the next day.—J. A. CLARK (57, Weston Park, Crouch End, N.).

Sexual Selection in Birds.—I have only just had the opportunity of seeing the editorial comment on the remarks made by me in 'The Zoologist' (1907, p. 238) in regard to the exhibition by the King Bird of Paradise of the inside of its mouth, which is of a bright apple-green, as part of its nuptial display—*viz.* that Darwin referred to the black colouring of the gullet in *Buceros bicornis* as distinct from that of the female, which is flesh-coloured, but did not consider that this could have been due to sexual selection. But this does not militate against the view which I have brought forward, since it is evident that the reason why Darwin thought thus was that he had no idea of such a part becoming visible during courtship any more than generally; for he says that it is very doubtful if the eyes, &c., of some birds have become variously coloured through sexual selection, since the mouth of this *Buceros* is as stated in the two sexes, "and their external appearance or beauty would not be thus affected." But of course, if the mouth was to be made visible, it would for all practical purposes *be* external, so that the appearance and beauty *would* be affected. The matter, in fact, is put upon a fresh footing altogether when it is found that various birds adorned in this curious manner do, in fact, display the part in question as part of their nuptial antics. That being so, there is nothing to differentiate such an inner from an outer adornment in relation to the theory of sexual selection, and inasmuch as the former can hardly, or not often, be due to protective or other such alternative agencies, it becomes a very crucial, and therefore important and interesting, point. Darwin, at any rate, I am convinced, would have been much interested had these facts been brought to his notice. We have now a little nucleus of birds, to which in time others will no doubt be added, who, in the nuptial season, make the distention of the jaws a special feature, thereby displaying in the most striking manner a surface of more or less brilliant or æsthetic colouring—*viz.* the King Bird of Paradise, the Shag, Fulmar Petrel, Kittiwake, Puffin, Guillemot, Black Guillemot, and Razorbill.—EDMUND SELOUS.

Effect of Recent Late Snow on Bird-Life.—The phenomenal snow of April 23rd and 24th will have caused many speculations as to its effects on bird-life. With us in Mid-Suffolk it began at about 5 p.m. on the 23rd, and continued so far as we know without intermission till about 9.30 a.m. on the next day. At that time there were quite four inches on the level, and probably more earlier in the day. The most pathetic figures in the wintry scene were some young Thrushes not long out of the nest, which seemed quite helpless and hopeless, and one brood of young Blackbirds a few days old was found cold and dead under the snow. We had two broods of Robins in old kettles, and both survived, though in one case only a single member of the family remains. I have made several inquiries as to birds being found dead, but could hear of none; a Land-Rail, however, was brought to Mr. Travis at Bury, evidently starved, being literally nothing but feathers and bones. A pair of Pied Wagtails and an odd bird (intermediate between the Pied and White Wagtails) disappeared for some days, but have since returned. Nightingales appeared to have deferred their migration, as none were seen or heard till May 1st. This was a brilliant day, with hot sun, and they were in evidence everywhere; early in the afternoon three were singing at the same time near this house. Swallows and Martins at the present date (May 4th) seem fairly numerous. The rapid melting of the snow flooded many meadows in this district, and numerous nests of Snipe and Ducks must have been destroyed. The Snipe would soon lay again, but for the Ducks with full clutches, hard sat on, the loss would be more serious. We had a visit from about ten Redshanks, which stayed for two days on the floods; this is the first record of the species in this parish.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Notes from Lakeland, Cumberland and Westmorland.—It is with some surprise that we note in the last issue of 'The Zoologist' (*ante*, p. 144) an article by T. C. Parker, entitled "Notes from Lakeland, Cumberland and Westmorland." The opening paragraph states that the notes are "largely" derived from our Records, but that some are from other sources (which he does not name, but they are evidently taken from Mr. H. Britten's "Notes from a Naturalist's Diary," published in the 'Penrith Observer'). Now, Mr. T. C. Parker has never seen the Carlisle Museum Record Bureau's Notes, but merely that part of them which has been published in the "local newspapers"; he does not know personally those individuals who have contributed to the Records, therefore he cannot vouch for their reliability, nor for

the authenticity of a single note from this source. Nearly the whole of the introductory matter is from our Report published in the 'Carlisle Journal,' Feb. 16th, 1906, and is republished without our permission or connivance in any way. We do not think that matter collected in this way, from local newspapers, &c., ought to be taken seriously by readers of 'The Zoologist,' as there is possibility of misprints, or even worse things, when passing through the hands of one who may not be a competent ornithologist, for Mr. Parker does not supplement the compilation by any notes of his own save one. He says:—"I have heard also Peggie Whitethroat." He may have heard that or any other name applied to the Dipper by those who know little of the bird, but "Peggie Whitethroat" is the well-known local name all over the county for the Whitethroat, *Sylvia cinerea* (Bechst.). — D. LOSH THORPE and LINNÆUS E. HOPE (Corporation Museum, Tullie House, Carlisle).

ARACHNIDA.

Curious Habits of Chelifers.—I can supplement the records which have recently appeared on this subject in 'The Zoologist' (*ante* pp. 77 and 159) from my own experience. Three specimens of a *Chelifer* were taken by myself at Mackay, Queensland, under the wing-cases of a longicorn beetle (*Agrianome gemella*, Pascoe).—R. E. TURNER.

INSECTA.

Rhynchota and their Parasites in South Africa. — Perhaps the enclosed may interest your readers. It was my intention some days ago to ask you why this bug, which you will at once recognize as common throughout this colony, attracts the little fly enclosed in paper. My attention was drawn to some common thistles (*Carduus*), a large species which often attains a great height before blossoming; the leaves are very spiny and have elongated points and white on the under surface. I give this description as I cannot get the plant's name yet. I have noticed this weed is a favourite for many insects, including the Homoptera. This bug can always be found in all its stages upon it; the little flies, which may be a *Cynips* of some kind, I found resting upon the bug's body in a state of excitement, for they were running up and down the wing-cases and underneath its body, for what reason I could not explain. Certainly there was not the usual odour. To this I attribute the possible state of the weather, which at the time was misty, or else the pairing had finished. I must state there were several others *in coitu* at the time; these I closely

examined to see if they were favoured also, but I could not see any signs of the fly. Perhaps the insect was in an unhealthy state, and there was some peculiar smell about it which was pleasant to the fly. I am curious to find out, and I leave this remarkable instance to you, as you may have at some time had it brought to your notice. Personally this instance is quite new to me. I have seen certain kinds of larvæ—ladybirds, &c.—which have favoured ants, and the reason assigned for this, I believe, has long since been satisfactorily explained. I must further tell you when I caught hold of the bug these flies, as might be expected under usual circumstances, never left their hold unless it was to run up my thumb, but back again to the bug. They kept their antennæ moving all the time, much like



ANOPLOCNEMIS CURVIPES, Fabr.



PROCTOTRYPID, gen.? sp.?

some of the Ichneumonidæ do when hunting, but when placed in the cyanide-tube they expired at once. — H. W. BELL MARLEY (Durban, Natal).

[The bug forwarded by Mr. Marley is the widely distributed *Anoplocnemis curvipes*, Fabr. The hymenopteron has been identified by Col. C. T. Bingham as belonging to the Fam. *Proctotrypidæ*, Subfam. *Scelioninæ*, and probably representing an undescribed genus and species. W. H. Ashmead, in his well-known Monograph of the North American *Proctotrypidæ* (Bull. U. S. Nat. Mus. No. 45, 1893), writing on the *Scelioninæ*, states that all the species are "strictly egg-parasites, scarcely a single order of insects being free from their attacks," and that the genus *Hadronotus* "is parasitic on different

Heteropterous Hemiptera belonging to the families *Coreidæ*, *Pyrrhocoridæ*, and *Reduviidæ*." The attack made on the South African Coreid is therefore well worth recording.—ED.]

Introduced Orthoptera.—The green Orthoptera brought over with bananas belong to various species, but the Natural History Museum has just received a rather rare species (not recorded as introduced into England before) from Mrs. Neville Ward, of Southampton. This is *Panchlora fraterna*, described by Saussure and Zehntner in the 'Biologia Centrali-Americana': Orthoptera, i. p. 97, n. 14 (1893) from Nicaragua and Panama. I may add that in my previous note on this subject, on the top line of p. 117, "hind wings" should read "hind legs." The insect referred to (*Diestrammena marmorata*, De Haan) is apterous. — W. F. KIRBY (Natural History Museum, South Kensington).

NOTICES OF NEW BOOKS.

Three Voyages of a Naturalist. By M. J. NICOLL, M.B.O.U.
Witherby & Co.

MR. NICOLL accompanied Lord Crawford on three cruises in his yacht 'Valhalla,' and as natural history objects always seem to have prompted these journeys, and many out-of-the-way islands were visited, the publication of this book became a duty. Our readers will remember that Mr. Nicoll published in this Journal his natural history observations made during the voyage of 1902-3 (Zool. 1904, p. 401), and communications have appeared in other journals with reference to the 'Valhalla' expeditions, for new species thus discovered have been described, and, what is more, considerable interest appertains to the observation of a strange marine animal appertaining to the cult of the "Sea-Serpent," which was sighted near Para, and of which a full account was given at a meeting of the Zoological Society of London in 1906. All this matter, or references thereto, with very much that is new, is given in this well-illustrated volume, which will doubtless find a place in the libraries of most naturalists.

One cannot but admire the action of Lord Crawford in showing what private enterprise can do for zoology, and how a private yacht can be made a vehicle for natural history investigation. A hundred years ago such voyages made for similar purposes would have brought the 'Valhalla' down to us at the present day among the celebrated vessels of zoological discovery, and we can well understand what her ornithological cargo would then have been; even now she has added considerably to our knowledge, and Mr. Nicoll has made the best of some unique opportunities. At Easter Island, however, his time was too short to do much to elucidate the many anthropological problems which all travellers have recognized, and which still require solution. May Lord Crawford take his yacht there again, and make a longer stay!

The Moths of the British Isles. By RICHARD SOUTH.
F. Warne & Co.

IN this Journal for 1906 we drew attention to Mr. South's 'Butterflies of the British Isles,' of which the present volume may be considered a continuation, and comprises the families *Sphingidæ* to *Noctuidæ*. Since the publications of Stainton and Newman, once the standard and almost only reliable books on the subject, we have had many volumes devoted to the British Moths. We may mention Meyrick's 'Handbook,' in which the classification and nomenclature were sought to be brought to date; then followed Barrett's volumes, so full of the most delightful personal observation; while Tutt's colossal undertaking, of which several volumes have appeared, may well prove the despair of any writer seeking to say a later word on the subject. Mr. South's publication would alone be welcome for its wealth of illustration, mostly coloured figures, and not only of the perfect insects but of eggs, larvæ, chrysalids, and food-plants. The letterpress can also be accepted as reliable and adequate. However, a retrograde step may have been taken by affixing "trivial" rather than scientific names to the plates; such names as "Hebrew Character," three different kinds of "Quaker," &c., are more difficult to remember than the generic and specific names by which they are usually known. But

this is only a detail, and scarcely affects the value of the publication.

Sketches of South African Bird-Life. By ALWIN HAAGNER, F.Z.S.,
and ROBERT H. IVY, F.Z.S. R. H. Porter.

THIS is the first South African ornithological book in which the camera has played its part, and given us nature photographs instead of artist's sketches; the first to be preferred by zoologists for local illustration, the latter when larger landscapes are required. Most of these beautiful blocks are from photographs taken by Mr. Ivy, of Grahamstown, a well-known colonial naturalist, and he must have many more, which we trust he will publish.

Zoology is making great strides in the South African colonies, especially in the Transvaal, where it would have made more, but recent retrenchment and replacement have caused the exodus of many good naturalists who went out to other appointments after the late war. Both ornithology and entomology are sciences which have largely found their support and advancement in the enthusiast and private student rather than in the paid official, for the ranks of the last must be always smaller than those of the former, and the latter are not always enthusiasts, and the former as certainly not always adequately equipped. A popular book like the one under notice therefore supplies a want, and helps the cause. It should have a vogue in South Africa, and in some lonely farm on the veldt or in some financial magnate's office may be read by a "rustic Milton" or "vulgar Cato," who may thus be incited to become the true naturalist—the observer.

The text is to the point; where not original it has been compiled with care. In some statements we do not entirely agree. Thus the distribution of *Alario alario* is described as "essentially a Cape colonial bird, but ranges into Great Namaqualand and the Orange River Colony as far north as Bloemfontein." It, however, extends further north; the writer of this notice procured it near the town of Pretoria, and that specimen has been examined by Capt. Shelley.

Ornamental Waterfowl: a Practical Manual on the Acclimatization of the Swimming Birds. By HON. ROSE HUBBARD. (Second edition.) The Walsall Press, Walsall.

THIS book will interest several classes of readers—the lordly owner of the park and lake, the more ordinary aviculturists with fluctuating opportunities, and the lovers of birds who keep pets; for Miss Rose Hubbard caters for all—for even the amateur who possesses “a wire enclosure six feet square,” and could thus enjoy the company of a pair of Mandarins. The first six chapters go to the root of the matter, and are devoted to Management, Food, Breeding, Diseases and Accidents, Pinioning and Exhibiting; and so far as we can see—we, who like others have sought, sometimes vainly and sometimes successfully, the help of manuals on diverse undertakings—this volume is more or less a *vade-mecum*.

In the body of the publication two hundred species are referred to, with descriptions of the birds, male and female, young, and eggs—in many cases with the prices one may expect to pay for them—and, what is more, a compilation of much bionomical information relating to them, and with their original habitats.

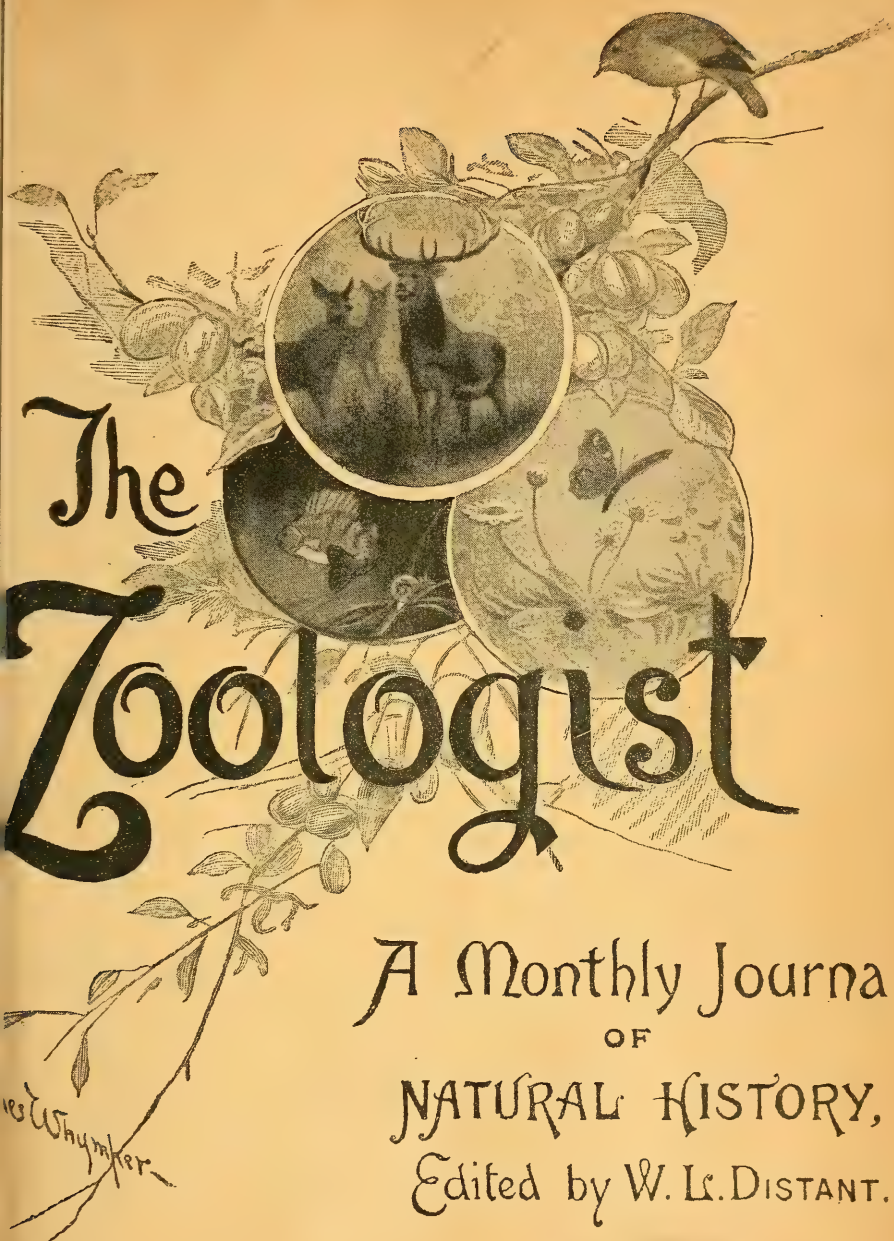
To those who possess a piece of water in their grounds, either large or small, here is a suggestion for a new venture—less costly than orchid-growing, and even more interesting than the breeding of prize poultry. The birds are hardy and not difficult to rear, and one need not commence with the two hundred species, but, like the prudent amateur horticulturist who begins with a selection of roses or chrysanthemums, he may delete Swans and commence with Ducks. We are now learning how to grow exotic water-lilies; why should we not extend our pleasures to ornamental waterfowl? To all who have such an inclination we can recommend this inexpensive volume, which has illustrations by Mr. Frohawk, and a “glossary of terms” to assist the non-ornithological reader.

EDITORIAL GLEANINGS.

WE have already (*ante*, p. 39) recorded the large freshwater fishes captured in 1907. We are now, by the help of Mr. Albert E. Jackson in 'The Anglers' News and Sea Fishers' Journal,' able to extend the record to the fishes of the sea.

NAME OF ANGLER OR MODE OF CAPTURE.	PLACE.	DATE.	WEIGHT. lb. oz.	REMARKS.
BASS (Specimen Weight, 8 lb.).				
Trawled	Bognor	August ...	16 0	
— Walters	Plymouth ..	September	15 0	
COD (Specimen Weight, 20 lb.).				
Long-line	North Sea ..	March, '08	86 0	Approximate weight believed to be a record for British waters.
J. C. Dight.....	Ballycotton	September	31 0	Reported to B.S.A.S.
CONGER (Specimen Weight, 18 lb.).				
Unknown	Polperro	July	72 0	Reported to B.S.A.S.
Swam ashore	Sheringham	February	70 0	
DAB (Specimen Weight, 1 lb.).				
T. Waller	—	—	1 8 $\frac{3}{4}$	Silver medal B.S.A.S.
J. Crimmen	Southwold ..	December	1 6 $\frac{1}{2}$	
DOGFISH (Specimen Weight, 10 lb.).				
E. A. Watts	Westcliff....	August ...	49 0	5 ft. 4 $\frac{1}{2}$ in. long.
R. M. Bell	Southend ...	September	41 10	Won Southend Fest.
FLOUNDER (Specimen Weight, 2 lb.).				
Unknown	St. Leonards	October ..	3 6	
G. Elsdon	Southend ...	November	2 8 $\frac{1}{2}$	
GREY MULLET (Specimen Weight, 3 lb.).				
Netted	Pagham Hbr.	March, '07	13 0	
Unknown	Weymouth..	September	6 2 $\frac{1}{2}$	Member W. & D.A.A.
GURNARD (Specimen Weight, 3 lb.).				
W. Adams (Mose-ly, Birmingham)	Ramsey, Isle of Man	Sept. 2nd	9 8	31 in. long; now in South Kensington Museum; 8 in. longer than any other known specimen.
HALIBUT (Specimen Weight, 20 lb.).				
S. Bullock	—	—	102 0	Silver medal B.S.A.S.
T. R. E. Lewis ..	Ballycotton	—	56 0	

NAME OF ANGLER OR MODE OF CAPTURE.	PLACE.	DATE.	WEIGHT. lb. oz.	REMARKS.
HAKE (Specimen Weight, 10 lb.).				
J. T. Ashby	Penzance ..	—	16 0	Challenge cup B.S.A.S.
T. Lewis.....	Penzance ..	August ...	15 4	
JOHN DOREY (Specimen Weight, 4 lb.).				
Prof. fisherman..	Folkestone ..	June	7 0	Long-line.
C. H. Hearne (Derby)	Penzance ..	September	6 0	Weighed seven hours after capture.
LING (Specimen Weight, 15 lb.).				
Unknown	Ballycotton	September	30 0	C hallenge cup B.S.A.S.
Oliver Wheeler ..	—	—	28 0	
MACKEREL (Specimen Weight, 1 lb. 8 oz.).				
W. Adams	—	—	3 8	Silver medal B.S.A.S.
E. M. Mallett ..	Letterfrank	—	1 13	
PLAICE (Specimen Weight, 3 lb. 8 oz.).				
Trawled	Folkestone ..	December	11 12	Hand-line.
Boatman E. Dalby	Folkestone ..	September	7 8	
POLLACK (Specimen Weight, 10 lb.).				
Trawled	Folkestone ..	November	17 0	And another 15 lb.
Conger Trot	Portland....	August ...	16 8	
POUTING (Specimen Weight, 2 lb.).				
Dr. P. V. Dodd ..	Folkestone ..	September	2 8	
H. Shirley	Ballycotton	—	2 8	
SEA-BREAM (Specimen Weight, 3 lb.).				
Cremer Roberts..	Folkestone ..	October ..	5 4	Reported by G. C. Challenge cup B.S.A.S.
W. Adams	—	—	5 0	
SOLE (Specimen Weight, 2 lb.).				
Prawn-net	Inslow.....	September	5 6	
— Page	Folkestone ..	October ..	2 12	
SKATE (Specimen Weight, 20 lb.).				
Professional	Unknown ..	June	230 0	Exhibited Leeds market.
C. J. Crisfield....	Letterfrank	August ..	200 0	Record for rod-caught.
TURBOT (Specimen Weight, 8 lb.).				
F. S. Stenning ..	Salcombe ..	September	27 0	Took cup for flatfish.
J. H. Campbell ..	Hastings....	October ..	13 10	
WHITING (Specimen Weight, 2 lb. 8 oz.).				
Long-line	Folkestone ..	April	5 0	Brace weighed 10 lb.
R. C. Wadman ..	—	—	3 3	Challenge cup B.S.A.S.
WRASSE (Specimen Weight, 3 lb.).				
C. H. Lacey	Portland....	—	4 12	Very fine fish.
T. H. Greehill ..	Weymouth..	September	4 11 $\frac{3}{4}$	



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THE ZOOLOGIST

No. 804.—June, 1908.

NOTES ON THE OYSTERCATCHER (*HÆMATOPUS OSTRALÉGUS*), WITH REFERENCE TO ITS HABIT OF FEEDING UPON THE MUSSEL (*MYTILUS EDULIS*).

By J. M. DEWAR.

To say that the Oystercatcher eats Mussels is to assert a commonplace. Yet little seems to be known regarding the methods by which the shells are opened and are deprived of their contents. Apart from the question of expediency, the absence of information on this subject may be attributed to the difficulties inseparable from close observation of birds that are wary and not easy to approach. Oystercatchers avoid those places which permit an observer to approach unseen, they act with great rapidity, their methods are varied within wide limits, and it is only by the exercise of much patience that results of any value are obtained. The present account is based partly on observations of the birds themselves, and partly on an examination of the empty shells which are scattered over the feeding-places.

Oystercatchers are creatures of regular habit; their timetable is regulated by the ebb and flow of the tides, which they follow with more or less precision. Speaking generally, it may be said that the Mussel-scalps extend across the shore from a line distant about one hour from the high-water mark to a line corresponding with the low-water mark of neap tides. The

Oystercatchers spend the time of high-water resting near the high-water mark. They fly over to the scalps exposed by the ebb, and occupy themselves with the uncovered shell-fish ; as the scalps become dry the birds turn their attention to the edges of the banks, the adjacent sand or mud, and the pools in quest of hidden Mussels. The period of slack water is devoted to repose, or is spent in other ways, and during the rise and flow of the tide over the scalps the Oystercatchers renew the search, until they are carried literally off their feet by the flood, when they betake themselves once more to the high-water mark. There is reason to believe that they are able to search effectively in the dark, and they are certainly active on moonlit nights.

The preceding paragraph shows that the Mussels must be surrounded by a certain amount of moisture if they are to meet the requirements of the Oystercatchers. With one exception, to which reference will be made, the Mussels which lie on the surface of the scalps are left alone when once they have become dry, and attention is concentrated on those which are covered by seaweed or by water, and on those which are buried in sand or mud.

The attitude of rest is one in which the valves of the Mussel are separated slightly along the free border, due to the tension of the elastic ligament ; the tight closure of the valves is caused by the contraction of the adductor muscles, and its maintenance implies continuous exertion. The attitude of rest is possible only when the shells are under water or in moist situations ; otherwise the delicate internal structures would shrivel. As soon as the shells become dry the Mussels must close their valves. Hence it is found that in the one case the shells are gaping slightly, in the other they are tightly closed. The former are liable to destruction by the Oystercatchers ; the latter, with one exception, as far as can be discovered, are invulnerable. It is essential that the moisture should be saline. Heavy rainstorms interfere with the search of the Oystercatchers by flooding the scalps with fresh water, which has the same effect as the drying of the shells.

Inspection of any scalps on which Oystercatchers have been feeding shows a litter of emptied shells. Some still lie in position on the scalps, others remain at the bottom of conical

excavations in the sand or mud, and many have been carried to bare patches of rock to be cleared of their contents.

Careful examination furnishes an important clue to the position the shells occupied during life, and therefrom to the manner in which they were opened. It will be seen that of the shells in which the valves are still united many have the dorsal borders uppermost, and a lesser number the ventral borders; and of the shells in which the valves have fallen apart, some have the ventral borders adjacent and others the dorsal borders. The position of these shells should be compared with that of the unopened *Mussels* on the banks. The majority rest with the dorsal borders uppermost, and are fixed securely to the ground by strands which emerge between the ventral borders of the valves. In few instances is the converse true. Occasionally they lie in a vertical position, the posterior ends being superior.

In the tightly closed shell the edges of the valves are in perfect apposition, with the exception of the middle portion of the ventral border. There a long and narrow fissure with rounded edges is present. This fissure is the weak point in the *Mussel's* armour, and it is seldom exposed on the open beds. Shells so placed are sought for eagerly by the *Oystercatchers*, and form the exception to the rule that dried and therefore tightly closed *Mussels* are left alone. When *Oystercatchers* are seen at work on dry *Mussel*-scalps it may be taken for granted that they are searching for these *Mussels*, and I have found repeatedly in these cases that only those *Mussels* were opened of which the ventral borders were uppermost. While the *Mussels* vary in size within wide limits, those which are attacked by the *Oystercatchers* agree closely in dimension with one another. One and a quarter inches to one and five-eighths inches in length by half an inch to three-quarters of an inch in breadth denote the normal variation. I have not seen *Mussels* of larger size than one and five-eighths inches by seven-eighths of an inch opened, and it would appear that *Mussels* smaller than one inch by half an inch are taken only when larger sizes are not available.

We have now to consider the way in which suitable *Mussels* are discovered, the manner in which they are opened, and how their contents are removed. Difficulties arise at once by reason of the variety of methods in use, the variable effect of these

methods on the shells, and the readiness with which the Oystercatchers adapt the methods to overcome varying and often unforeseen circumstances. I have thought it best to classify the shells according to the places at which they are opened, to describe the principal methods and their results in each class, and to mention some of the exceptions as they come under notice.

I. Mussels opened through the dorsal borders.

These form approximately seventy-eight per cent. of the shells opened by Oystercatchers. Bearing in mind that the Mussels in which the dorsal borders are present are the normal inhabitants of the banks, that they are available only when a sufficiency of moisture permits a separation of the valves, the reader will understand that the Oystercatchers must search for the gaping shells, and the birds are to be seen at these times walking sedately over the banks, their heads directed forwards, and their bills in a position ready to strike. Each Mussel is approached in the line of its major axis, and is submitted to a careful inspection, usually from the front, though why this should be I have not been able to decide.

If the Mussel meet with approval the Oystercatcher strikes a sharp blow with the point of its bill on the summit of the dorsal border, apparently to find out whether or not the bill will pass between the edges of the valves. Frequently this does not happen, and the bird continues the search. When the result of the tap is favourable the bill is pushed down into the Mussel before the valves have time to close by a number of jerks with great rapidity and force, until the deepest part of the much compressed bill comes to lie lengthwise between the margins of the valves. Usually further action is necessary, and it must follow soon after the introduction of the bill; but in a few instances the bird raises its head, looks about, and then proceeds leisurely to clear out the contents.

When this happens it is probable that the shell has been thinner than usual, and the stroke has not been delivered fairly between the valves; in consequence a small fragment of one valve is driven in before the point of the bill, and through the hole thus formed the Oystercatcher is able to extract the con-

tents. Occasionally empty shells are found which exhibit the depression of a fragment at the margin of one valve.

The simplest procedure is to shake or lever the bill violently from side to side, and is sometimes successful in separating the valves, as the Mussels are fixed securely to the ground. The two methods most in use may be employed independently one after another, or may follow the method just described, as circumstances require.

One method is as follows: The bill, sunk vertically between and in line with the valves, forms a pivot of a movement of the Oystercatcher to one side of the Mussel. As the Oystercatcher walks slowly round the bill turns through quarter of a circle and comes to lie with its greatest depth across the fissure, causing a marked separation of the valves. The same effect may be produced without moving the feet, by rotating the head to one side on a vertical axis. The other method is equally simple: The Oystercatcher lowers its head almost to the ground on one side of the Mussel, and the point of the bill, being well inside the shell, presses on the opposite valve which is separated widely from its fellow. This may have to be repeated several times. It is curious that, as far as observation goes, the Oystercatcher walks round or lowers its head to its own left side, and the left valve suffers more often than the right, because the bird approaches the Mussel more often from the front than from behind.

Now and again another and less simple method of opening the shells is seen. It may be employed from the first, or after other ways have been tried and have been found wanting. I have seen a group of Oystercatchers use it to the virtual exclusion of other methods for several days, and then apparently it was abandoned for months. This method requires that the bivalve be approached from behind. The bill is pushed downwards between the valves and behind the ligament, and perhaps, after ineffectual attempts to open the shell by lateral and rotary levering, the bill is drawn slowly and firmly backwards and downwards between the valves, until the head almost touches the ground behind the Mussel, and the bill, instead of being at right angles to the long axis of the Mussel, lies parallel to it between the margins of the valves at the posterior end. From

this position the bill is pushed in firmly until the point seems to reach the anterior end of the Mussel, when snapping motions of the mandibles occur, and are followed by gradual separation of the valves. It is plain that this method cannot be applied to Mussels buried in sand.

When the empty shells are examined it is found that, with the exception of those opened by the last method, one valve in each is fractured—that the fracture extends in most cases from a point on the dorsal border of the valve, one-eighth of an inch from the posterior end of the ligament, along a curved course following one of the lines of growth to the anterior end of the shell, and passes above the insertion of the anterior adductor muscle.

The upper and anterior fragment of the valve is raised by the passive contraction of the ligament, and its posterior free end is twisted outwards. Less frequently the fracture turns backwards instead of forwards, separating an upper and posterior portion from the rest of the valve. Occasionally the fracture extends transversely across the valve, isolating the posterior portion, and more rarely from the ventral border transversely across the valve to a point about a quarter of an inch below the posterior end of the ligament, and then horizontally to the anterior end.

In this case the lower and anterior portion of the valve is separated, the posterior portion united to the upper and anterior portion remains with the other valve, and from posterior end of the ligament is twisted markedly outwards.

It is noteworthy that the edges of the valves seldom show where the bill has been introduced. In the only example I have seen the margins of the valves a little behind the posterior end of the ligament were ground away, so that when the valves were brought together an elliptical hole was formed, which admitted the deepest part of a bill lengthwise.

It can be shown experimentally that the fracture starts at the place where pressure is applied, and when the lever is rotated between the valves it begins at that edge of the lever towards which pressure is directed. On a few occasions these processes were verified by observing the Oystercatchers at work, and afterwards by examining the particular shells they had opened.

II. *Mussels opened through the ventral borders.*

These amount to nine per cent. of the empty shells. Mussels in which the ventral borders are directed upwards are vulnerable at all times, and while the relative percentage is low the actual percentage may be as high as a hundred. When they are exposed to view on the banks they require no tentative inspection or tapping, and are opened at once. Oystercatchers can be seen to sight them from a distance, and to run eagerly to open them. The valves are separated in the ways which have been described, and whenever close inspection is possible the bill is seen to enter nearer the posterior than the anterior end of the fissure. The method whereby the bill, after being introduced, is lowered from the vertical to the horizontal position, and then pushed home to the anterior end of the shell, I have seen in use once with a shell of this class. It was employed after an ineffectual attempt had been made to separate the valves by a vigorous shaking of the bill sidewise. The snapping motions of the mandibles in the anterior end of the shell were followed by the gradual and wide separation of the valves, which were seen plainly to fall away from one another on to the sand.

Damage to the margins of the valves occurs seldom or never, and a considerable proportion of these Mussels is opened without fracture of the valves. When fracture does occur the right valve usually suffers, and the commonest form is a simple transverse fracture extending from the point on the margin of the valve where the bill was introduced to the dorsal border. Frequently a large quadrilateral fragment is separated from the valve opposite the posterior half of the fissure, and from the lower angles of the gap thus formed lines of fracture may travel to the dorsal border and to the anterior end.

More Mussels are opened by way of the ventral borders when buried than when exposed to view. Those Mussels are covered by a film of sand or mud, frequently as much as one inch in depth, and are found by a process of tapping the surface with the point of the bill. At first the ground is tapped here and there in tentative fashion. Sometimes a single tap leads directly to the Mussel; more often numerous taps are made in a small area until one is made in the right place, when the bill sinks quickly

into the sand and the Mussel is opened in one or more of the ways which have been described.

It is probable, as Macgillivray* suggested in the case of the Dunlin, that "they discover the object of their search rather by the kind of resistance which it yields than by touch like that of the human skin." Sand overlying smooth rock is equable to the touch, and I have noticed that the tapping instrument meets with greater resistance over the presenting border of a Mussel than elsewhere, but I have not been able to distinguish a Mussel from inanimate objects. Possibly the movement which the Mussel makes in closing its valves and drawing them more nearly to the rock is transmitted to the bill through the sand; the high proportion of hidden Mussels opened through the ventral borders, together with the circumstance that the relative frequency of the several positions assumed by the Mussel is not influenced by the presence or absence of overlying sand and mud, leads me to believe that it is so, and the movement which apprises the Oystercatcher of the presence of its prey often defeats the end in view, unless the ventral border of the Mussel is open to attack.

At these times delicate imprints made by the point of the bill are seen on the sand or mud around the scalps. Usually at wide and unequal intervals, in places they are crowded together, and there may be a few shallow probings, some of which are bridged by septa of sand or mud, showing that the mandibles are slightly separated. In several places these clear imprints are obliterated by footmarks, often deeper than usual; in the centre of each place there is a deep conical pit surrounded by ejected material, and the empty shell lies at the bottom, or it is found near by.

The Oystercatcher removes the Mussel from its anchorage under the sand or on the open banks from choice, or as the result of the undesirable attention of others, and to avoid the prolonged submersion of the head under water which extraction of the contents sometimes requires. A fine distinction is drawn between the shells of the two classes. Those which present the ventral borders are opened up before being detached from their foundations, while those in which the dorsal borders are present

* 'History of British Birds,' vol. iv. p. 212.

may have the valves separated slightly when the Mussels are in position, and the opening up completed at leisure after detachment. The reason is to be found in the characters of the two borders. Along the dorsal border the valves meet at an acute angle and rest insecurely on the ground, while on the other side they meet at an open angle, and are flat-bottomed like a barge.

The Oystercatcher empties a shell at the bottom of a deep hole in the sand as easily as one on the open ground.

After the shell has been opened the separation is effected by introducing the upper mandible within the shell, and by gripping a valve—usually the damaged one—between the mandibles, a few vigorous shakes and a pull in the upward direction being sufficient to detach the shell.

III. *Mussels opened through the posterior ends.*

Forming about thirteen per cent. of the shell remains, the valves of these Mussels are never fractured, and at most show some comminution of the thin posterior edges. The fragments remain attached to each other, and are not driven inside the shell.

It is, therefore, likely that the valves are separated to some extent before the bill is introduced. This can be the only route to the interior of the buried shells, the long axes of which are vertical, but in the case of Mussels placed horizontally on the banks it is not easy to understand why the posterior end of each should be chosen.

The method is simple enough. The point of the bill is inserted quickly between the valves and pushed home by a number of forcible jerks. Vigorous shaking of the bill sidewise follows, and is sufficient to open the shell. When the Mussel lies horizontally the Oystercatcher approaches from behind with its head lowered nearly to the ground, and the point of the bill directed forwards.

A feature which the shell opened at the posterior end exhibits more frequently, and to a greater degree than the shell opened by any of the other routes, is a partial rotation of one valve on the other, about a point situated near the middle of the ligament.

Among the litter of empty shells the presence of a variable number of unopened shells is of daily occurrence.

Some are quite uninjured, the margins of the valves are in perfect apposition, and are tightly closed. More commonly the valves of each Mussel are rotated partially on one another, so that the margins overlap, and a portion of the mantle is nipped between the edge of one valve and the inside of the other. When the valves are not shut firmly this rotation is produced easily by applying pressure to the valves in opposite directions; the Mussel makes no attempt to readjust the relative position of the valves, and slowly adducts them in their altered relation. As might be inferred from what has been stated, the right valve is as a rule lower posteriorly than the left, and the dorsal border is uppermost as the shell lies on the ground.

Shells which measure not more than an inch nor less than half an inch in length are searched for, and opened in the same way as the larger specimens, but the introduction of the bill and the subsequent manœuvres require less force, and are performed more rapidly. Frequently, however, the Oystercatcher approaches with the bill opened widely, and pushes the upper mandible between the valves; simultaneous rotation of the head to one side on a vertical axis and approach of the lower to the upper mandible follow, so that the upper mandible rotates into a transverse position within the fissure, and the posterior portion of one valve is crushed and twisted outwards in the firm grip of the bill.

Shells of half an inch by quarter of an inch and those of smaller size are torn from the rocks, one at a time, and are swallowed entire. Macgillivray,* speaking of the contents of the stomachs, states that the bivalve shells are generally, "when of small size, either entire or merely crushed"; and Professor Patten† has found "in several gizzards small bivalves with unbroken shells which measured 12 by 5 mm."

The greater part of the mollusc makes a few mouthfuls. Large pieces are torn away and transferred to within reach of the tongue by jerks of the head. At each projection of the head the bill, as it were, slides over the piece, and the return of the

* 'History of British Birds,' vol. iv. p. 156.

† 'Aquatic Birds of Great Britain and Ireland,' p. 249.

morsel is prevented by pressure of the mandibles and the reverted cusps on the palate.

When entrance has been gained through the middle part of a border, one end is cleared out first and then the other, the Mussel, if detached, being turned round by the Oystercatcher, and, if not, the Oystercatcher, after emptying the end farthest from itself, walks round to the opposite pole and clears out the other. When the chief part of the mollusc has been removed there remains material adhering to the inner surface of the valves, chiefly the mantle. To remove this material the bill is employed like a pair of scissors. It is laid flatly on the inner surface of a valve near one end, and as it is pushed forward it snips away the adherent flesh. After reaching the opposite end of the shell the bill is returned to one side of its starting point, and snips its way along a line adjacent and parallel to the preceding, and so on, until the adherent flesh has been removed from both valves. This skilful procedure is carried through rapidly without pause, and often without moving the shell. It is seldom seen towards the end of the feeding periods, and at these times shells are to be found in which portions of the mantle remain.

Consideration of the methods employed by the Oystercatcher leads to the conclusion that fracture and rotation of the valves are in no way essential to the complete exposure of the contents of the shells. This view is supported by the cases in which neither occurs, and by the position, relative to the Mussel, in which the bill is introduced. It will be seen that the bill is inserted in the posterior half of the commissure between the valves, and when the attack is made on the borders it is pushed down just in front of the posterior adductor muscle. In this position the bill separates the valves most widely where separation is most required. Observation proves that mere rotation of the bill between the valves is sufficient to rupture the fused portion of the mantle, and to impair the action of both muscles; they contract very slowly after slight extension. The wider separation, usually produced, tears the posterior muscle from its attachment to the valve, which forms the fulcrum of the lever, and the anterior adductor gives way in similar fashion whenever the valves are set farther apart.

The position in which the bill is introduced, the quickness with which the Oystercatchers remove the anterior and posterior parts of the molluscs, and the interesting cases in which the bill, after it has been sunk vertically between the borders, is borne down between the posterior margins, destroying on its way the posterior adductor, and is pushed on at once to cut through the anterior muscle, go far to prove that the Oystercatchers are acquainted with the position and relative importance of the two muscles, and fully realize the necessity for their early destruction.

The fractures, when they occur, depend primarily for their production on the relative strength of the shell, the adductor muscles, and the ligament; their situation and character are determined by the position in which the force is applied, the position of the muscles and the ligaments, and the direction of the lines of least strength in the shell.

In these notes I have attempted to describe the ways by which Oystercatchers deal with Mussels; I have shown how the Oystercatchers are limited to certain Mussels, how entrance to the shells is effected, how the valves are separated so as to prevent their adduction while the molluscs are being devoured; I have brought forward observations which seem to prove that the Oystercatchers, far from being actuated by blind impulse, on the contrary proceed deliberately to remove certain structures which hinder the achievement of their desires; and I may say with truth that we have in the Oystercatcher a living illustration of the principle of the lever, by means of which a comparatively feeble instrument is enabled to render the stoutest resistance of no avail.

It remains for me to point out that interest must centre largely on the manifold ways in which the bill is employed, and on the attempts which may be made to assemble its numerous modes of action in the order of their development in Time.

THE PENGUINS AND THE SEALS OF THE ANGRA DE SAM BRÁS.

BY JAMES R. McClymont.

PENGUINS were seen by the followers of Vasco da Gama in the Angra de Sam Brás on the south coast of Africa in the month of December, 1497, and in March, 1499. The anonymous author of a *Roteiro* of the first voyage of Vasco da Gama to India calls the birds "sotelycairos," which word is now written "sotilicarios." It is most probably derived from the Spanish "sótil," subtle.

The anonymous diarist tells us that the "sotilicarios" could not fly because they had no quill-feathers in their wings, that their cries resembled the braying of asses, and that they were as large as drakes.* Castanheda, Goes, and Osorio also mention the "sotilicario," and compare its wing to the wing of a Bat, and certainly, if the under surface of the wing was contemplated by these chroniclers, the comparison is not inapt. The last author whom I shall cite in connection with the "sotilicario" is Manuel de Mesquita Perestrello, who visited the South African coast in 1575. Professor Diogo Kopke quotes from a manuscript of his *Roteiro* in the Oporto Library to the effect that the winglets of the "sotilicario" were covered with minute feathers, and that they dived after fish for food for themselves and for their young, which were hatched in nests constructed of the bones of the fish which were caught by them and by Seals.†

There is nothing at which one can cavil in these statements unless it be at that which asserts that the nests were constructed of fish-bones, for this is not in accord with the observations of our contemporaries, who tell us that the nests of the Cape

* 'Roteiro da Viagem de Vasco da Gama em mccccxcvii,' Segunda Edição, Lisboa, 1861, pp. 14, 105.

† 'Roteiro,' p. 142.

Penguin (*Spheniscus demersus*) are constructed of small stones, shells, and *débris*.*

In the Angra de Sam Brás, which is believed to be Mossel Bay, or some other bay in proximity thereto, there were Seals in great numbers. On one occasion the Portuguese counted three thousand in the bay. Some were as large as Bears, and their roaring was like the roaring of Lions. Others were quite small, and these bleated like kids. The author of the Roteiro appears to think that there was more than one kind of Seal in the bay, but this is doubtful, for Seals of different species do not usually herd together. The difference in size and in power and quality of voice may be explained by supposing that there were differences of age and sex amongst the Seals; all may have been of that species upon which various names have been bestowed, as *Otaria pusilla*, *Arctocephalus delalandii*, and *A. antarcticus*. An adult male *A. delalandii* is recorded to have attained eight feet and a half in length, and cubs from six to eight months old measure in length about two feet and a half.† In the same bay Anchovies were plentiful, and were caught and salted for provisions on the homeward voyage.

I conclude by mentioning the animals which were observed in the earlier stages of the journey. In August, 1497, in which month the 'Sao Rafaell,' commanded by Paulo da Gama, in which our author sailed, was, I opine, slowly making its way across the Gulf of Guinea, birds which resembled large Herons were seen; these may have been Great White Herons on a migratory journey southwards. On the 27th day of October in the same year, when the vessels were nearing the south-west coast of Africa, Whales and Seals were encountered, and also "quoquas,"‡ which appear to have been Whales of a different kind from those named "baléas." On the 8th day of November the ships cast anchor in a wide bay, which extended from east to west, and which was sheltered from all except north-westerly winds. It was subsequently estimated to be sixty leagues distant from the Angra de Sam Brás, and as the Angra de Sam

* Moseley, 'Notes by a Naturalist on the Challenger,' p. 155.

† 'Catalogue of Seals and Whales in the British Museum,' by J. E. Gray, 2nd edition, p. 53.

‡ Can "quoquas" be "corcovas" and signify humpbacks?

Brás was also sixty leagues distant from the Cape of Good Hope, the wide bay in which the ships anchored must have been in close proximity to the Cape. The voyagers named it Angra de Santa Elena; it was probably the Table Bay of modern maps. On the Cantino Chart, which was drawn in 1502, the "G. de Sta ellena" is laid down in the position of Table Bay.

The Portuguese came into contact with the inhabitants of the country adjacent to the anchorage; they had tawny complexions, and carried wooden spears tipped with horns, bows and arrows, and Foxes'-tails attached to short wooden handles. These were probably used to brush flies away. Their food was the flesh of Whales, Seals, and Gazelles ("Gazellas"), and the roots of certain herbs. Lobsters* abounded at this anchoring-place. The diarist affirms that the birds were similar to the birds in Portugal; there were Cormorants, Wood-Larks, Turtle-Doves, and "guayvotas." "Guayvota" appears to be related to "guaiva," moat or ditch, and may signify a kind of water-fowl. M. Morelet translates by "mouettes," regarding "guayvota" and "gaivota" as synonymous.

* Crayfish ("Cape Lobster").—ED.

ON THE LONGEVITY OF BRITISH ENTOMOLOGISTS.

BY W. F. KIRBY, F.L.S., &c.

SOME years ago I began to make memoranda on the longevity of British entomologists, and on recently mentioning it to my friend Mr. Distant, he was so much interested that he asked me to put together a few notes for publication. I have therefore compiled a statement of the ages at death of upwards of three hundred British entomologists, chiefly from Hagen's '*Bibliotheca Entomologica*' and the current entomological magazines, adding the date of death as a clue to any person who might wish to refer to the obituary of any particular entomologist.

I have included only *British-born* entomologists, omitting a few of whose actual birthplace there was some uncertainty. On the other hand, some names will be found (*e.g.* Walsh and Riley) whose work was chiefly carried on in America or the Colonies, and who died there. Again, a few names will be found better known in other branches of science than in entomology—such as John Russell Hind, the astronomer, who was probably the first English entomologist to form a collection of European Lepidoptera, as opposed to British Lepidoptera on the one hand and Exotic Lepidoptera on the other.

The names represent all ages at death, and all classes of society; but it will be seen that by far the larger proportion lived beyond middle life, and many reached an advanced old age. Consequently, the results are such that one might confidently recommend anyone who wished for a long life to turn entomologist; and the list should also be an inducement to insurance companies to grant reduced premiums to entomologists, as some of them do to teetotalers. It will be noticed, too, that entomologists of the seventeenth and eighteenth centuries also seem to have lived fairly long lives. The moral of the investigation seems to be a confirmation of the effects of an interesting occupation in conducing to long life.

APPROXIMATE AGES OF BRITISH ENTOMOLOGISTS AT DEATH, FROM
TWENTY-ONE TO NINETY-FOUR, WITH THE ADDITION OF THE
YEAR OF DEATH.

21 (1). J. W. Jobson (1880).	Henry J. Stevin Pryer (1888). F. G. Cannon (1906). Norman Dalziel Warne (1905). George Robert Crotch (1874).
22 (1). Robert W. Sinclair (1880).	38 (2). R. G. Keeley (1874). John Henry Leech (1901).
24 (1). John William Shipp (1898).	39 (3). Edward Doubleday (1849). Henry Waring Kidd (1884). Arthur Unwin Buttleley (1905).
26 (1). Waldo Irvin Bennett.	41 (2). Trovev Blackmore (1876). William Lello (1874).
27 (1). William Clayton (1890).	42 (4). Edward William Robinson (1877). William Molyneux (1698). Hugh Edwin Strickland (1883). Alfred Owen (1874).
28 (2). William Alexander Forbes (1883). William Wing (1885).	43 (1). Thomas Young (1820).
29 (1). Walter Philip Watson (1881).	44 (3). Frederick Octavius Pickard-Cam- bridge (1908). George Bennett (1848). Hamlet Clark (1867).
30 (3). William Arnold Lewis (1877). Arthur Sidney Olliff (1896). P. F. J. Lowrey (1831).	45 (2). William Ramsay McNab (1890). George Adams (1795).
32 (1). Arthur Bliss (1890).	46 (4). Howard W. J. Vaughan (1892). James Hamer (1887). N. C. Tuely (1879). William Elford Leach (1836).
33 (2). Henry Wyndham Vivian (1902). Ambrose Quail (1905).	
35 (1). James Mortimer Adye (1908).	
36 (2). John Bickerton Blackburn (1881). Henry Ramsay Cox (1880).	
37 (5). Francis Willoughby (1672).	

47 (4).

James Wood-Mason (1893).
 John Nathaniel Still (1895).
 John Anderson Cooper (1896).
 John Henry Fowler (1903).

48 (3).

Charles Horne (1872).
 Arthur John Chitty (1908).
 Charles Tester (1895).

49 (4).

William Garneys (1881).
 John Christopher Dennis (1898).
 James Anderson (1808).
 Andrew Melby (1851).

50 (2).

E. T. Atkinson (1890).
 Charles Healy (1876).

51 (6).

William Farren (1887).
 Thomas W. Wonfor (1878).
 George Newport (1854).
 Samuel Purchas (1628).
 Thomas Wilson (1887).
 William Watkins (1900).

52 (4).

Francis Archer (1892).
 Charles Wyville-Thomson (1882).
 Francis Buchanan White (1895).
 Charles Valentine Riley (1895).

53 (7).

Thomas Henry Allis (1870).
 Edward Daniel Clarke (1822).
 William Curtis (1799).
 Robert Smith Edleston (1872).
 George Guyon (1878).
 Edward Caldwell Rye (1885).
 S. C. Tress-Beale (1885).

54 (3).

H. Harpur Crewe (1883).
 Charles William Dale (1906).
 Thomas Moufet (1604).

55 (3).

John George Children (1832).
 Edward Horton (1870).
 John Keart Lord (1873).

56 (7).

George Carden (1894).
 Thomas Desvignes (1868).
 Robert Jameson (1854).
 Edward Ralph Pearson (1890).
 Richard Platt (1698).
 William Roxburgh (1813).
 Thomas Vernon Wollaston (1878).

57 (4).

Robert Bakewell (1867).
 Edwin Brown (1876).
 Clarence Fry (1897).
 Thomas Moncrieffe (1879).

58 (9).

Thomas John Bold (1874).
 Noah Greening (1879).
 Christopher George Hall (1890).
 John Hellins (1887).
 Abel Ingpen (1854).
 William Laycock (1870).
 William Miles Maskell (1898).
 Henry Salt (1877).
 Thomas Wilkinson (1876).

59 (7).

Thomas Eedle (1888).
 John Hill (1775).
 George Norman (1882).
 William Prest (1884).
 James Robinson (1878).
 John Sang (1887).
 John Sanders Stevens (1903).

60 (9).

William Gabriel Blatch (1900).
 Arthur Dowsett (1897).
 Edward Carteret Dobrée Fox (1906).
 Robert Francis Layne (1887).
 John Charles London (1843).
 James Francis Stephens (1852).

Charles Turner (1869).
Charles J. Watkins (1907).
James Trimmer Williams (1844).

61 (7).

John Berkenhout (1791).
Jean Baptiste Jos. Dormer (1902).
John Finlay (1897).
Robert Hind (1881).
Philip Brookes Moon (1904).
Charles Turner (1868).
Benjamin D. Walsh (1869).

62 (9).

James Batty (1893).
John Thomas Carrington (1908).
John Thomas Harris (1892).
George Shaw (1813).
George Perry Shearwood (1891).
Joseph Sidebotham (1885).
John Richard Wellman (1895).
Adam White (1822).
John George Wood (1889).

63 (6).

John Brooks Bridgman (1899).
Thomas Chapman (1879).
Philip Crowley (1901).
Alfred Ficklin (1902).
Alexander Henry Haliday (1869).
Osbert Salvin (1898).

64 (6).

George Barnard (1894).
John William Dunning (1897).
George Robert Gray (1872).
Henry Moss (1882).
William Henry Tugwell (1895).
Christopher Ward (1900).

65 (12).

Edwin Birchall (1884).
Henry Doubleday (1875).
Abraham Edmonds (1869).
Robert Hislop (1880).
John Hunter (1793).
Robert C. Robert Jordan (1890).
Beebee Bowman Labrey (1882).

Alexander Goulman More (1895).
Andrew Murray (1878).
William Edward Shuckard (1869).
John Scott (1888).
Francis Walker (1874).

66 (9).

Thomas Atkin (1879).
John Thomas Boswell (1888).
Benjamin Cooke (1883).
William Sweetland Dallas (1890).
John Ellis (1776).
William Hardy Haworth (1833).
Dionisius Lardner (1859).
William Swainson (1855).
William Farren White (1899).

67 (9).

Henry Walter Bates (1892).
E. C. Buxton (1879).
Joseph Chappell (1896).
Nicholas Cooke (1895).
Henry Deane (1874).
James English (1888).
Robert M'Lachlan (1904).
William Reid (1858).
Edwin Sheppard (1883).

68 (3).

Charles Golding Barrett (1904).
William Boys (1803).
John Turberville Needham (1781).

69 (7).

William Buckler (1884).
Thomas Carpenter (1831).
John Gray (1882).
John H. Hocking (1904).
Fred. Wollaston Hutton (1906).
Edward Wesley Janson (1891).
James Edward Smith (1828).

70 (9).

Mark Catesby (1749).
William Daniel Conybeare (1857).
Samuel Dale (1739).
Thomas Henry Huxley (1895).
William Wilson Saunders (1879).

Henry Tibbats Stainton (1892).
J. Aspinall Turner (1867).
Alexander Wallace (1899).
Alfred Henry Wratislaw (1892).

71 (6).

Thomas Cooke (1885).
William Duppa Crotch (1903).
Ferdinand Grut (1891).
William Harper (1884).
John Kidd (1851).
William Macleay (1892).

72 (15).

George Bedell (1877).
John Ashton Bostock (1846).
John Charles Bowring (1893).
Henry Thomas Colebrook (1897).
Thomas William Daltry (1895).
Thomas Edward (1886).
(Archdeacon) Hey (1882).
Wm. Chapman Hewitson (1878).
John Russell Hind (1895).
William Martin (1894).
Edward Parfitt (1892).
Ebenezer Sabine (1902).
G. H. K. Thwaites (1882).
John Jenner Weir (1894).
William Yarrell (1856).

73 (7).

Joséph Sugar Baly (1890).
Daniel Barrington (1800).
John Harrison (1907).
Martin Lister (1711).
Wm. Humphrey Marshall (1818).
Georgiana Eliz. Ormerod (1896).
Frederick Smith (1879).

74 (10).

Frederick Bates (1903).
Alfred Beaumont (1895).
Charles Robert Darwin (1882).
William Gurney (1879).
James B. Hodgkinson (1897).
Allan Maclean (1869).
F. J. Sidney Parry (1885).
John Emmerson Robson (1907).

Sidney Smith Saunders (1886).
J. B. Wilkinson (1902).

75 (6).

Peter Collinson (1768).
H. J. Gore (1889).
John Edward Grey (1875).
George Haggard (1892).
Edward Newman (1876).
William Thompson (1892).

76 (8).

Robert Calvert (1891).
Henry Dorville (1874).
Henry Guard Knaggs (1908).
Thomas Ansell Marshall (1903).
John Arthur Power (1886).
John Ray (1704).
W. C. Unwin (1887).
Morris Young (1897).

77 (6).

Henry Baker (1775).
Joseph Banks (1820).
Walter Battershell Gill (1900).
Frederick Moore (1907).
Robert Sibbald (1720).
George Robert Waterhouse (1888).

78 (7).

Stephen Barton (1899).
William Chaney (1907).
William Derham (1735).
Philip Henry Gosse (1888).
Thomas Kelsall (1904).
Eleanor A. Ormerod (1901).
Sidney Smith (1885).

79 (6).

Edward Armitage (1896).
Frederick Bond (1889).
George Edwards (1773).
Neil McArthur (1879).
Fran. Polkinghorne Pascoe (1893).
W. H. Z. Walcott (1869).

80 (4).

James Scott Bowerbank (1877).

NOTES ON THE PIED FLYCATCHER (*MUSCICAPA ATRICAPILLA*).

By E. P. BUTTERFIELD.

EVER since my boyhood days a certain glamour has always clustered around the Pied Flycatcher, but it was not until the year (I believe) 1874 that I made my first acquaintance with this most charming bird. Previous to the above year I had heard of its breeding in Wharfedale. This, however, was said to be a very rare occurrence, but my brother James Alfred Butterfield, of Plumstead, and I decided on a visit to confirm or discard this record; so, as might be expected, neither of us was at all sanguine that our visit would be attended with success. However, after travelling about twenty miles, half of which was accomplished on foot, immediately on entering the wood, one can imagine our surprise when a fine male Pied Flycatcher was seen flying from one old oak to another in a small wooded dell, after which it was seen to enter a hole in an old oak tree, in which was found its nest.

An experience such as this comes to a naturalist but at rare intervals, and the above will always stand out as a "purple patch" in my life.

On subsequent investigation we found this species, within a certain limited area, to be not only common but what might be described as fairly numerous—as plentiful perhaps, or more so, than in any other of its habitats in Britain.

Scarcely a year has passed since my first acquaintance with this bird but I have paid a visit to its haunts, and this familiarity has been provocative of an ever-increased interest.

The distribution of this species in Britain is very peculiar, for, while it is said to have bred occasionally in the Southern Counties and Midlands, it seems to affect more particularly hilly and deeply wooded valleys where old timber abounds, but is by no means confined to districts which embrace such physical

features. It is locally common in some parts of Wales, and the same remarks are applicable to Yorkshire and Westmorland, but further north it becomes more scarce; whilst in Scotland it is a scarce breeding species, and in Ireland, where it was first recorded in 1875, it is still more so.

Regarding its distribution in Airedale, I have heard or known of but two instances of its nesting for over forty years—once near Malham, and once in the Goit Stock Valley. Once it commenced to breed in Bingley Woods, but was dispossessed by a Blue Tit from a hole in an old beech tree, nearly as soon as it commenced to build its nest.

What makes its scarcity in this district (Airedale) all the more remarkable is the fact that in not a few places the combination of physical features is almost identical with those which obtain in its haunts in Wharfedale, where it is so common; and, moreover, the Aire Valley would appear to be one of the migration routes to its more suitable breeding stations, since it is met with here nearly every spring in late April, but disappears after a very short stay. I am not aware of any instance of this species breeding in Lower Airedale. It has been seen at Collingham (Harrison), and a nest is said to have been found at Wetherby in 1889 (Stephens).

In the East Riding it is more to be regarded as a bird of passage, although it is said to have nested in one or two cases. Probably some of the individuals which nest in North-west Yorkshire and Westmorland work their way up the river valleys from the east coast.

Near Pontefract it has been observed, but whether it breeds there I am not in a position to say. At Roche Abbey, on the borders of Nottinghamshire, it is said to be a rare summer visitor, and so presumably breeds, but is a common breeding species at Stainborough Park, near Barnsley. North-east of Stainborough Park, in a line to the borders of Westmorland, it is but sporadically distributed, and has been reported as having bred at Huddersfield, Halifax, and Hebden Bridge (Nelson), but I am not aware of any recent occurrences within these districts. It is not included in the records of Upper Ribblesdale by Peake, but it breeds lower down the valley near Gisbourne. It appears to be absent in the Ingleton district. It is reported as having

been seen on the Wenning, near Bentham, on the borders of Westmorland, by James Moore in 1904, but whether on migration it is not stated ('Yorkshire Weekly Post,' June 4th, 1904). It has been found nesting in the Sedburgh district (Fortune), but must be considered as a very rare bird in that locality. In the 'Birds of Upper Nidderdale,' by Roebuck, Clarke, and Storey, the Pied Flycatcher is said to be a "local and not numerous summer visitant, breeding at Brimham, Guyscliffe, Pateley, Wath, and as high as Lofthouse."

I spent a few days near the head of the Wharfe a few years ago, making Buckden my headquarters, extending my investigations to Hubberholme, over the fells to Hawes, thence to Aysgarth and Bishopsdale, without ever seeing this species. Mr. Chapman, however, includes it in the 'Birds of Wensleydale' as a comparative rare summer visitant, and so mentioned as amongst the rarer birds that visit the district of Leyburn, and has been known to nest near Masham (Tinkler). A few breed annually near Richmond and Marske, but it is a rare and local summer visitant to Lower Sealedale, and the same remark applies to the Barnard Castle district. It is locally distributed in the woods near Middlesbrough, and also in the Whitby district it is sparingly distributed. I have seen it near Mulgrave Castle Woods, and it occurs occasionally at Langdale Rigg, near Scarborough; also further west to Pickering and Kirbymoorside. Duncombe Park, near Helmsley, would appear to be its headquarters in the North Riding. Near the Cleveland Hills it is said to have occurred at Swainby. In the early sixties, however, I spent a month in Seugdale, which is adjoining Swainby, without ever seeing this bird, but it is possible it may have been overlooked, although this is difficult to conceive on account of its conspicuous plumage. Other localities in Yorkshire where this Flycatcher breeds are Hovingham in Ryedale, Bilsdale, Farndale, and by the River Wiske near Northallerton.

I have never found the nest in any other situation than in a hole of a tree varying in height from a few up to thirty feet, and is a slight structure, somewhat slovenly and similarly built, but not so substantially, as the nest of the Redstart. There are usually deposited five to six eggs, which have again a resemblance

to the eggs of the Redstart, and anyone who has observed the habits of this Flycatcher must have been struck with its close affinity to that bird.

Once I found the nest of this species in a hole in a mountain-ash, occupied by a pair, the male of which was in its immature plumage, and it was some time before I could discover which was the male bird. When hunting for insects it has a curious habit at times of dropping from some distance to the ground, returning to some dead branch. Like its congener, its spotted cousin, it is fond of building in the same place year after year, and rather courts than shuns the presence of man.

One of its provincial names is "Coldfinch." Whether this has its origin because it affects mountainous districts, or on account of its plumage, it is impossible to say; but whether this name "Coldfinch" is a misnomer or not, no other British bird can form a warmer friendship for man, and anyone who can lightly misplace its confidence, much less seek the destruction of this bird, deserves to be ostracised from the society of all true naturalists.

I very well remember the first and only time I saw the Roller in this district, and the first instance to come to my notice, after long years of searching, of the breeding of the Hawfinch; and my impressions on first seeing the Scotch Argus in all its glory in its only Yorkshire station, and my rapture at the first sight of the Clouded Yellow Butterfly in this district in 1876; but no witchery that can be conjured up from my memory can equal my first sight of the Pied Flycatcher. Since then my pilgrimages to its haunts have been many, and I trust they may be still more. It is the "White Admiral" among birds. Long may England continue to be a *dulce domum* to this charming and interesting bird!

NOTES AND QUERIES.

MAMMALIA.

Otters destroying Moorhens.—While fishing a few weeks since on a river in Westmorland, I happened to remark to the river-watcher that I noticed a great diminution in the number of Water-hens (*Gallinula chloropus*), and that now I did not see more than one where a few years ago I could count twenty. He told me that Otters (*Lutra vulgaris*) had recently taken to killing them, and showed me the mouth of a drain which was thickly covered with their feathers. This river is well stocked with trout, but contains few coarse fish or eels, which may possibly account for the changed habits of the Otters. I should be greatly interested to learn whether any of your readers have noticed a similar destruction of these birds on other streams.—R. H. RAMSBOTHAM (Elmhurst, Garstang).

AVES.

The Songs of Chiffchaff and Willow-Wren.—Col. Meyrick's note (*ante*, p. 190), headed "Mimicking Song of Chiffchaff," is very interesting. After describing the Chiffchaff as finishing its normal song with an exact reproduction of the song of the Willow-Wren, he asks whether there is any other possible explanation of its having the song of the two species, besides that of mimicry. I think it just possible that these two closely allied species had originally one type of song, that this was rather the Chiffchaff type than the Willow-Wren type, and that the Willow-Wren's notes have been added in the course of ages, just as the Lesser Whitethroat seems to have added its loud high notes to the normal Whitethroat song, which it still constantly utters in a subdued tone, before indulging in its own peculiar performance. This idea occurred to me as the result of hearing, on April 13th, 1897, as recorded in my diary, a Willow-Wren (apparently just arrived) singing but a few notes, and those notes curiously like the notes of the Chiffchaff. It may not be easy for anyone familiar with the two songs to imagine how this could be, but it undoubtedly was the fact that the bird was a Willow-Wren,

the song also a Willow-Wren's, but strangely modified so as to resemble the Chiffchaff's. There was a pair of Chiffchaffs mating close by, but I could not conclude that it was a case of imitation, for this was the first Willow-Wren I had seen, and the weather had been extremely cold. My own belief was that the bird, before acquiring its full song, had on its arrival unconsciously fallen back on the primæval song of its race. That Col. Meyrick's Chiffchaff should have added the Willow-Wren's song to its own may possibly mean that a Chiffchaff may, like the Willow-Wren, be inspired to add a strain to its own original song, but without abandoning the latter, as the Willow-Wrens have done. All Chiffchaffs, I may add, are well worth listening to with care; they differ among themselves curiously.—W. WARDE FOWLER (Kingham, Oxon).

Mimicking Song of Chiffchaff.—The song mentioned by your correspondent, Col. Meyrick, has been recorded by Mr. G. A. Dewar in his 'Hampshire Highlands,' and also by a lady who writes to the 'Hampshire Chronicle' under the name of "Caer Gwent." It is curious that it should have been so long overlooked.—J. E. KELSALL (Rectory, New Milton).

Lesser Redpoll Nesting in Middlesex.—As there do not appear to be many recorded cases of the Lesser Redpoll (*Linota rufescens*) nesting in Middlesex, the following note may be of interest. Last year several pairs of this Redpoll were to be seen daily about Hampstead Heath during the spring and summer, and were no doubt breeding there. I saw young broods, evidently not long out of the nest, accompanying the parent birds. In autumn the several family parties flocked and soon left, and I could not find any about here during the winter. This year two or three pairs of Lesser Redpolls returned to the Heath about May 12th, just as the birch trees were well in leaf. On May 28th I found a nest containing eggs, and upon which the female bird was sitting. This nest was placed in a fork at the end of a branch of a birch tree, and about fifteen feet above the ground. On the following day I found another nest about half a mile away from the first, which was also placed in a birch tree, being in a fork against the main stem and about twenty-five feet up. In this nest the female bird (June 1st) is still busy with the lining, which appears to be white vegetable down of some sort. As is usual with Redpolls, the birds at both nests are very confiding, and can be easily observed at close quarters through glasses.—H. MEYRICK (Holly Cottage, The Mount, Hampstead).

Note on the Great Spotted Woodpecker.—In February and March, 1907, I had opportunities in Switzerland of observing the habit of the Great Spotted Woodpecker (*Dendrocopus major*) recently detailed by Mr. Selous (*ante*, p. 81). Several times I saw the bird carry a fair-sized spruce-cone to the crevices, which were higher up than those described by Mr. Selous. The lowest I found was more than four feet from the ground, and one natural hole that the bird used was about ten feet up. All the crevices were in walnut trees, these being the only trees near. There was a large collection of cones at the foot of each tree, some hardly eaten at all, and others almost entirely demolished. On one occasion I saw the bird fly with a cone to the tree which it used most, but, finding the crevices there already occupied, it flew with the cone to another tree. It is perhaps also worth noting that three other species of Woodpecker—Green, Middle Spotted, and Lesser Spotted—were all to be seen frequently in the vicinity, but none of the others ever came to the spruce trees, the Green and Middle Spotted keeping to the walnuts, and the Lesser Spotted chiefly to a row of poplars.—H. G. ALEXANDER (3, Mayfield Road, Tunbridge Wells).

Great Northern Diver and Eared Grebe.—Referring to the article on "The Birds of Staines" (*ante*, p. 137), may I venture upon a couple of remarks? From the author's description of the habits of the bird he calls a Great Northern Diver (*Colymbus glacialis*), I think the bird must have been the Black-throated Diver (*C. arcticus*), the two being very difficult to distinguish at a distance by their plumage only, when in winter dress, their behaviour being a better guide; and, from his description of the behaviour of this particular bird, I should have little hesitation in calling it a Black-throated Diver. Personally, I can only distinguish the two by their habits when in winter plumage, and I have repeatedly watched them in Orkney. With regard to the Eared Grebe (*Podiceps nigricollis*), although the upward bill to the beak is a certain guide to the species when in the hand, I very much doubt—in fact, am practically certain—whether this could be seen in a free bird, even were it within a yard of the observer, and when in winter plumage the two are very difficult—indeed, almost impossible—to distinguish, unless it be by the slightly smaller size and shorter beak of *P. nigricollis*. Of course, the name Eared Grebe is very misleading, as the Slavonian species (*P. auritus*) in summer plumage has far more right to the name, and the so-called Eared Grebe is now as often known as the Black-necked, which its Latin name (*P. nigricollis*) signifies, and which is a much better name for it, as I have

repeatedly seen Slavonian Grebe in summer plumage called Eared Grebe, and do not wonder at the mistake, as they are far better named by their Latin name (*P. auritus*).—H. W. ROBINSON (Lansdowne House, Lancaster).

Ornithological Notes from Mayo and Sligo.—The unusually cold, wet, and stormy weather during March and April, combined with the long continuance of high northerly, north-west, and north-east winds, and the three days' snowstorms from April 23rd to 26th, delayed the arrival of many of our spring visitors, and also had the effect of driving many of our resident small birds far inland for shelter from the bitter northerly gales; and the consequent result is that very few of the latter returned to breed in their old haunts about here. The Chaffinches, Yellowhammers, and the three species of Tits appeared to be the only birds that held their ground. Blackbirds were in fair numbers, but not as many as last season, while the Song-Thrushes were remarkably scarce. Only two pairs were observed about this place, when in other seasons many pairs bred in the garden and plantations. Only one pair of Greenfinches bred in the garden this season, where several pairs had nests, and also about the place in other years. Even Sky-Larks deserted our fields, and very few Meadow-Pipits remained. Altogether the scarcity of our resident small birds is very remarkable. The Sandwich Terns were unusually late, not appearing in the estuary until April 17th, which was strange, because several were observed on Lough Conn on the 12th, showing that they kept to the open bay, probably from scarcity of food inside the estuary. Whimbrels were heard on the 30th, as usual appearing by May 1st, or a day or two earlier, this season. On April 29th I observed a Common Sandpiper, the first time I ever saw one on the shore here in spring, though they always put in an appearance on their return from the inland breeding haunts. A few Swallows appeared on the 18th on the Bunree River, near Ballina, but it was not until the end of the month that they spread out over the country. On May 2nd Little Terns were seen on the estuary, and by the 11th the three species—Common, Arctic, and Little—were in large numbers fishing about the estuary. The White Wagtails visited Bartragh on the 6th inst., when eight birds were seen, but evidently did not remain for any time. However, on the succeeding day (the 7th) Captain Kirkwood had the pleasure of seeing a fresh arrival of ten birds. He was in his garden when he was attracted by the sight of some small birds flying high overhead; these, when passing over, suddenly lowered their flight and dropped down outside

the garden-wall, on a marshy flat between the garden and shore (the usual haunt of these visitors on their first arrival on the island). The birds appeared tired and very tame, and allowed an approach within eight or ten yards. I do not know how long these birds remained, but several were seen on the 9th and 10th, and when I visited the island on the 11th I was just too late to see a pair that had been on the island before I landed. On the same day, when going to Bartragh, a flock of about fifty Dunlins in full summer plumage passed our boat, flying up towards Castleconnor, and later I observed as many others feeding on the sands, while a small flock of eight or ten fed in a little bay by the marsh in which they bred last year; these kept by themselves, and occasionally fled to and from the marsh, as if thinking of nesting there again this season.

In last month's 'Zoologist' I was very much interested in Col. H. Meyrick's account of a Chiffchaff mimicking Willow-Wren's song, for a somewhat similar case came under my notice on April 22nd, 1887. I was passing a small plantation here when I heard feeble, subdued notes of Willow-Wren and Chiffchaff. The weather was cold, and as on their first arrival these birds' song is always affected by the state of the weather, I thought both birds were trying their notes. I listened and watched for some time, but could only see one bird (a Chiffchaff), and he began with two or three notes of the Willow-Wren, ending with the Chiffchaff note, twice repeated. I listened and watched for a long time, until I satisfied myself that only the Chiffchaff was in the plantation.

In Mr. C. Oldham's "Field-Notes on the Birds of the Ravenglass Gullery" (*ante*, p. 166), I was pleased to see that the Sandwich Terns were breeding in company of Black-headed Gulls, confirming my observations, on this west coast, that in every breeding haunt of Sandwich Terns that I know of these birds associate with the Gulls, and not with the smaller Terns. At Cloona Lough, Rathroneen Lough, Lough Conn, and Lough Erne all the colonies were alongside of or among Black-headed Gulls. At the great breeding haunt of Arctic Terns on Ardbolan Island, off Drumcliff Bay, Co. Sligo, no Sandwich Terns breed, nor among the many hundreds of Arctic and Little Terns on the western end of Bartragh Island.—ROBERT WARREN (Moy View, Ballina).

Notes on the Birds of West Renfrewshire (Caldwell District), 1907.—

January 10th.—Song-Thrushes have returned to us after two months' absence.

13th.—Watched the Dipper to-day bathing itself as a Duck does,

then preening its feathers. Its mate sat silently watching the performance till its completion, when both flew down the stream.

17th.—Pair of Goosanders on the loch.

18th.—A male Golden-eye on the loch.

20th.—Thirty-five Pochards are on the loch. Blue Tits are very plentiful.

24th.—Snow falls to-day, followed by frost.

February 13th.—Storm still holds on.

16th.—Snow and ice gone. Saw a solitary Brambling. Song-Thrush singing for the first time.

17th.—Heard the Mistle-Thrush this afternoon.

21st.—Saw five Bramblings this morning. There were twenty-seven Pochards, four Mallards, and five Tufted Ducks—four males and one female. The latter was behaving in a most excited manner, standing up and beating the water with her wings, while the males did not seem to pay any attention. This continued all the time I watched them.

23rd.—Lapwings are now plentiful.

25th.—Heard the Blackbird sing to-day.

26th.—Chaffinch and Greenfinch in song. Walking home in the moonlight, about 10 p.m., I heard the “drumming” of the Snipe. The Tawny Owls were very noisy.

27th.—Sky-Lark sings to-day.

28th.—First spring call of the Lapwing to-day.

March 2nd.—Saw the Yellow Bunting this morning, and heard the Redshank for the first time this spring.

* 3rd.—Curlews have returned to-day to their nesting quarters.

6th.—About one hundred and twenty Pochards on the loch, also Tufted Duck and Mallard.

7th.—Saw a Heron flying low over the loch to-day, when a Pochard rose with extended wing as if to strike it. The Heron evidently thought so, as it immediately rose higher in the air.

8th.—Saw a Rook standing on the head of a sheep as it lay peaceably.

10th.—Four inches of snow this morning. Heard the Goldcrest to-day.

16th.—Two pairs of Golden-eye on the loch. Dipper's nest to-day with four eggs.

23rd.—About thirty Fieldfares flew overhead.

25th.—Grey Wagtails have returned. Saw a Water-Rail to-day. Great Crested Grebe has returned.

29th.—Three Goosanders on the loch.

30th.—Watched some Coal-Tits for a while.

31st.—Saw the first Lapwing's egg to-day, also a pair (male and female) of Wheatears.

April 6th.—Spent to-day in the rookery. Found two nests with six eggs, and several with five; also one nest containing young birds. Forty Fieldfares flying north-east.

7th.—Every place white with snow. Fieldfares abundant, passing over us.

8th.—First primrose shows itself to-day.

9th.—White Wagtail at the loch.

19th.—Fieldfares have been passing in small flocks for some days. To-day I saw about fifty flying north-east. Moorhen's nest with eight young ones.

23rd.—Sedge-Warbler seen to-day.

24th.—Common Sandpiper arrived; last year the date was the 12th, which is about the usual.

28th.—The keeper's dog to-day flushed a Land-Rail from some gorse. This is the earliest record I have. Found a Red Grouse's nest with ten eggs.

30th.—Two Snipes' nests, each with four eggs.

May 3rd.—Went to-day to examine some Jackdaws' nests built in spruce-fir trees. They are very large structures, being roofed over with sticks, just leaving a hole large enough to admit the bird. One of the four I examined containing eggs was quite open. The keeper told me he found in the last week of April a Woodcock's nest which was "run."

5th.—Heard the welcome sound of the Cuckoo's voice.

6th.—A Curlew's nest with four eggs. I got near enough to flush the bird from her nest—a most unusual experience.

7th.—Barn-Swallows arrive.

8th.—Met the assistant keeper to-day with a young Tawny Owl in his pocket. It was found in the "Crow Wood," and bore marks of having been pecked by the Rooks.

9th.—Heard the Land-Rail "craking."

11th.—Found another Red Grouse's nest with ten eggs, hard-sat. There were four pairs of Golden Plovers, but I could not find a nest.

12th.—Sedge-Warblers abundant and in fine song.

16th.—Water-Rail's nest with seven eggs; also three Mallards nests with seven, five, and one egg respectively.

17th.—Dunlin's nest with four eggs, and also Curlew's with four eggs.

18th.—Saw Common Whitethroat and Spotted Flycatcher to-day.

27th.—Saw for the first time a Curlew's nest, with the four young birds still in the nest.

[Absent from home most of June and July.]

June 30th.—Cuckoo last heard calling in the district.

August 7th.—Saw a solitary Land-Rail.

September 3rd.—There is ice on the water this morning.

26th.—Swallows and House-Martins gone.

October 1st.—Pochards have returned to the loch.

4th.—Dipper in fine song.

6th.—Blackbird sings for about half an hour to-day. Four Red-wings flew past, going south-west.

9th.—Five Swallows to-day—must have been a late nest.

16th.—Watched a Fox for a while this morning.

20th.—Flushed eighty Snipe (Common) from the coarse growth at the foot of the loch.

25th.—Tufted Duck on the loch; they now nest every year in this district.

26th.—A few Fieldfares.

27th.—Large flock of Fieldfares.

November 23rd.—Saw a lovely cock Bullfinch to-day.

24th.—Went to the loch this morning, with pleasing result. There were twenty-eight Mallard, five Wigeon, one pair of Golden-eye, one pair of Teal, thirty-one Pochards, and fifty Coot. From the coarse growth at the foot I succeeded in putting up two hundred and forty-seven Common Snipe, and do not think I shifted them all. I saw fifteen Bramblings among the beeches in the wood.

December 1st.—A solitary Pied Wagtail to-day.

7th.—Saw the Marsh-Tit to-day; they are not easy to watch, being much more shy than any of the other Tits.

9th.—Three Long-tailed Tits.

15th.—Had another try at the Snipe amongst the coarse growth at the loch, but only succeeded in putting up one hundred and eighty. They are very difficult to move, rising in fives and tens, and thus making it easy to count them. Jack-Snipe have also been fairly common this winter. The under-keeper told me he saw five Grey Geese (species unknown) about the middle of December on the loch.

These notes are sent in the hope that they may prove of interest to some south-country readers by way of comparison.—T. THORNTON MACKETH (Hall of Caldwell, Renfrewshire).

Notes from Shipley District.—

March 29th, 1908.—Fairly large flocks of Pied Wagtails noted on the River Aire between Saltaire and Bingley, as usual, at this time of year, composed mostly of males. On the 31st Pied Wagtails were simply swarming—hundreds were seen on the same stretch, also one or two Grey Wagtails. One Sand-Martin—an exceptionally early arrival, particularly so when we consider the Arctic weather we have had this spring. This bird seemed strong on the wing, securing its food off the stream, hovering like a Wagtail, and picking something as it floated down stream; although I was within two yards of it frequently whilst thus engaged, I could not make out any fly on the water.

April 2nd.—On same ramble, when only very few Pied Wagtails were noted, and these seemed in pairs; wind S.S.W. and decidedly warmer, later in day N.W. No Sand-Martin. Perhaps it had returned south, as Seeborn pointed out that birds frequently arrived too early in the extreme north, before the break-up of ice and frost-bound land; consequently they had to return on account of food-supply. I believe we get a few stragglers in this country, too, that arrive too early.

5th.—In a small plantation quite near the River Aire, where previous notes were made, one brown Wren, with a small party of Marsh-Tits. I might mention here that the Chiffchaff does not breed in Upper Airedale; so I longed to hear the song of this (to us) rarer visitor. However, patience has its limitations, even to a bird-watcher—but sing it would not—the smallness of the wing seemed to help me in deciding it to be the Chiffchaff. At the sides of the river and in the fields adjoining were many Pied Wagtails; one big flock rose high in air, and away up stream. On the 7th and 8th, on the same ground, scarcely a bird to be seen.

12th.—Reversed the walk, starting at Bingley to Saltaire, with Mr. Bedland, of the Bradford Naturalists; very few birds to note. Creepers in full song, and evidently a few pairs still breed here. One Sand-Martin within a few yards of the place where one was noted on March 31st.

Birds are exceptionally late this year, and up to this date, with the exceptions mentioned, there is hardly a migrant to be seen about here.—W. H. PARKIN (Studholme, Shipley).

NOTICES OF NEW BOOKS.

African Nature Notes and Reminiscences. By FREDERICK COURTNEY SELOUS, F.Z.S. With a "Foreword" by President ROOSEVELT. Macmillan & Co., Ltd.

"MR. SELOUS is the last of the big-game hunters of South Africa." Such is the statement of President Roosevelt, and such is the verdict of all of us. Wealthy sportsmen may still find game in South-East Africa, but the days of the old Nimrod are gone. Mr. Selous, hunting in his shirt, shoes, and soft hat, reminds one of Gordon Cumming, and the period between these two great hunters of similar garb and equal love of laying low the mighty game, marks an era which exhibits the decline and fall of the great mammalian fauna of South Africa.

In this book, much of which has been previously published in fragmentary contributions to different journals, Mr. Selous reaches his high-water mark in zoological observation, and it contains bionomical monographs of several animals. As regards the Lion this is markedly the case, and the peculiar haunts of the Inyala are focused in two tersely written and highly interesting chapters.

Of more than average importance is the chapter dealing with the Tsetse Fly, particularly in its connection with the Buffalo, and the author's conclusions as to the interdependence of these two living creatures, the diminution of the one being accompanied with the scarcity of the other; in other words, their mutual disappearance in certain once well-known fly-infested areas.

But what has particularly impressed the writer of this notice is the *experimentum crucis* afforded by Mr. Selous's observations made during his long sojourn in the South African veld, and in the bush of that region, on much of the theories of protective coloration and mimicry. As President Roosevelt, with his shrewd common sense, remarks: "His observations illustrate

the great desirability of having the views of the closet naturalist tested by competent field observers"; and, again: "The most conspicuous colors of nature, for instance, are, under ordinary circumstances, black and white. Yet we continually find black, and sometimes white, animals thriving as well as their more dull-coloured compeers under conditions that certainly seem as if they ought to favor the latter."

Mr. Selous's chapters i. and ii. may be carefully read and pondered by some of the enthusiastic missionaries in the ultra cult of "protective coloration," "recognition marks," and "mimicry." Not that these theories are repudiated so much as largely qualified, and this is the philosophical position. The argument in their favour was originally one of possibility, which rightly developed into probability; but by the vogue in which these interesting problems have been received, and the extremes to which they have been pushed, they are rapidly being relegated into the domain of unlikelihood. And this is the pity of it.

A Guide to the Elephants (Recent and Fossil) Exhibited in the Department of Geology and Palæontology in the British Museum (Natural History). Printed by Order of the Trustees.

THIS is another of those useful little handbooks by which a visitor to our National Museum may acquire a thorough knowledge of the few animals to which it rightly claims to be a 'Guide.' It is written by that well-known palæontologist, Dr. C. W. Andrews, and is, in fact, a short and handy monograph of the Proboscidea. We believe that these booklets are of the highest educational value to those visitors who wish to know not only the names and position of the preserved animals they see, but also their history in time. For a lesson on the process of animal evolution the Proboscidea afford a splendid text, and we would suggest that this inexpensive 'Guide' might be placed in the hands of schoolboys, who, after having read it, should be taken to the Museum to see the subject of its pages, which might afterwards be reperused. The evolutionary conception by this and similar means would be clearly attained,

which is seldom accomplished by the publication of "popular books" on the subject. The 'Guide' is well illustrated.

A Guide to the Gallery of Fishes in the Department of Zoology in the British Museum (Natural History). Printed by Order of the Trustees.

THIS 'Guide' has been prepared by Dr. Ridewood in daily consultation with Prof. Lankester, as we are told in the preface. The collections of Fishes in the British Museum are not only famous for their number, but for the care with which they are conserved and have been worked out. Most of these are spirit-specimens, and are studied by the ichthyologist. But in the Gallery there are exhibited preserved specimens and models which have recently been thoroughly rearranged and added to, and these appeal to the visitor, for whose instruction this handbook has been written. By its aid he can be made acquainted with all the principal types they represent, and the elements of the classification by which they are arranged. It also describes much of their peculiar structure, life-history, and distribution, thus making the Gallery to serve the purpose of a popular lecture-room, with the object-lessons round the walls. No written natural history can impart the pleasure and instruction to be derived from the visit to a good museum collection with an adequately written handbook. This one contains ninety-six figures.

EDITORIAL GLEANINGS.

THE Society for the Destruction of Vermin was formed in January, 1908, to organize a national movement for the extermination of rats and other vermin noxious to man. Among the vermin included within the scope of the Society's operations are rats, mice, sparrows, ticks, fleas, mosquitoes, and flies. It stands amply proved by the testimony and researches of many eminent scientists that rats and other vermin constitute a most serious menace to public health. They foster and disseminate disease germs, and in many instances are the leading factors in disease epidemics.

Bubonic plague is now known to be conveyed mainly by rats. In most recent outbreaks this disease has been noticed to occur first amongst the rat population of the invaded areas; from these it passes to man by means of fleas, which inoculate him with the germs they have imbibed in feeding on infected rats. It is evident that the destruction of rats is an essential, if not the most important, preventive against plague. Malaria is known to be directly conveyed to man by infected mosquitoes. The extermination of mosquitoes is being carried out very actively in numerous malarial districts with remarkable results. Yellow fever: This pestilence has been proved to be conveyed from the sick to the healthy by mosquitoes. The steps taken by the Americans in Havana afford striking demonstration of the part played by these insects in the propagation of disease. After various sanitary methods had been tested and found futile, a campaign was undertaken against the mosquitoes, and the disease disappeared as if by enchantment. Sleeping sickness: This fatal disease is conveyed and inoculated by tsetse-flies. The European Powers, alarmed at the rapid extension of the disease and the heavy mortality it is causing, have convened an International Conference of the leading scientific authorities on tropical diseases to concert methods for the destruction of tsetse-flies.

Among other examples may be mentioned enteric fever and cholera, conveyed by the house-fly; various forms of relapsing fever, by ticks and bugs; trichinosis, by the rat; and red-water fever and other diseases in cattle, by ticks. The striking discovery has recently been

made that the house-fly is a principal factor in the dissemination of the epidemic of summer diarrhoea among infants. Probably many other diseases of men and domesticated animals of which little is known are similarly conveyed by vermin.

Although the agency of vermin as disease conveyors has been suspected from the remotest antiquity, it is only of late years that it has received definite proof. As already mentioned, action has been taken as regards mosquitoes, and now, owing to the recrudescence of plague and the proof that the rat is the main agent in diffusing it, action is being taken against this animal in various countries, as, for example, in Denmark, where a special law has been enacted with the view of destroying these rodents. The fly also is receiving attention; in New York a Special Committee has just handed in its report, giving some very valuable suggestions as to the best way of dealing with the fly question. In this country reports have also been drawn up by the Public Health Committee of the London County Council and the Liverpool School of Tropical Medicine. Although the Society for the Destruction of Vermin has decided to direct its earliest operations against the rat tribe, it contemplates in the future, as opportunities may arise, the initiation of destructive measures against mice, house-flies, and the other vermin mentioned herein.

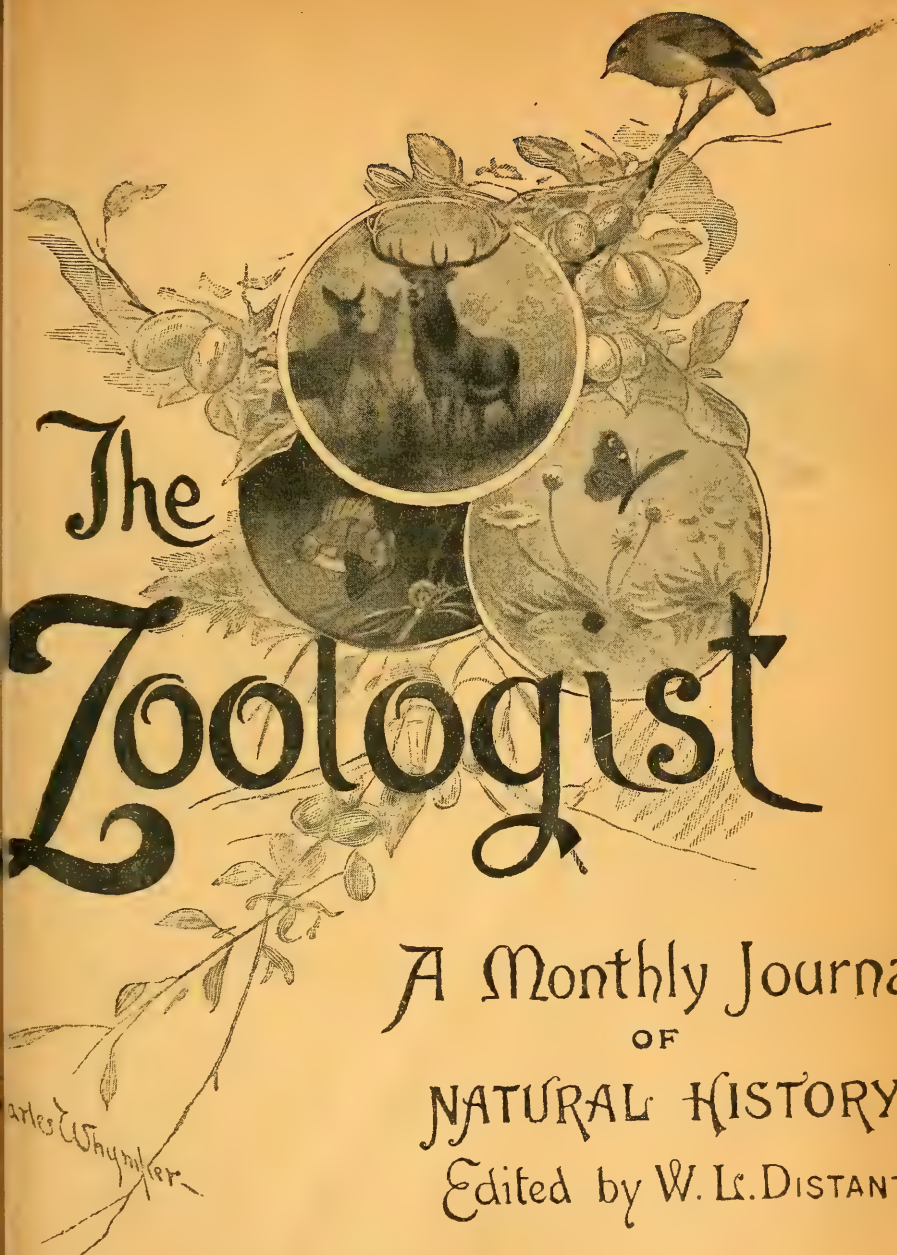
Apart from considerations of health, on economic grounds the destruction of the rat is much to be desired. The depredations of this animal are very costly. It has been computed that there are not less than thirty million rats in the United Kingdom at the present day, and that the loss through their incessant ravages amounts to some five million pounds yearly. Fields of corn are oftentimes seriously damaged; stores of meat, poultry, and cereals, both in warehouse and on shipboard, are heavily taxed; buildings are damaged; docks and wharves are overrun; and so serious have the depredations become in many quarters—notably the London Docks—that private proprietors have abandoned all hope of decreasing the plague of rats by individual efforts. The cost of the repressive measures taken against rats alone in London now exceeds ten thousand pounds a year.

The Society for the Destruction of Vermin, which is in process of incorporation under Board of Trade regulations as a public association not formed for the object of making profit, will collect information from all sources of the birth, breeding, distribution, and life-history of noxious vermin. It will pay especial attention to the part played by vermin in disease causation. Disseminate as widely as

possible the acquired knowledge by means of the general Press, and also by special reports, leaflets, and lectures. It will endeavour to make known to the public the dangers connected with each kind of vermin, the necessity for exterminating certain species, and the best and most merciful lawful methods of destruction. Carry out experiments in the field, test any promising measures suggested for the destruction of vermin, and, if funds permit, distribute gratuitously, to such persons as are unable to afford the expense, the necessary substances and apparatus. Organize, in co-operation with other associations and public bodies, a practical campaign for the destruction of vermin. (To conduct operations an Active Committee has been formed.) And encourage and assist in any legitimate way the operations of Rat and Sparrow Clubs and similar bodies. In the promotion of the above objects obtain, if possible, such Government, Municipal, or other public aid as may be thought desirable.

The services of the Society will be placed at the disposal of Municipalities, Boards of Health, Agricultural Societies, Railway, Shipping and Dock Companies, and other bodies interested in the suppression of vermin.

The Society is under the Presidency of Sir James Crichton-Browne, and Mr. A. E. Moore is its energetic Secretary. The temporary address is 1, Palace Garden's Mansions, London, W.



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THE ZOOLOGIST

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SPECULATIONS ON THE ORIGIN AND DEVELOPMENT OF THE PARENTAL INSTINCT IN BIRDS.

BY BRUCE F. CUMMINGS.

I.

BIRDS do not show a great many gradational types from simple to complex forms in the development of this instinct, but there are sufficient to indicate the base-lines along which it has progressed. Allowing always a broad margin for various circumstances which, wholly unknown to us, may have considerably modified its development or altered its course, I hope to suggest in the following paper the necessary conditions for its origin, and the forces which have moulded its subsequent advancement.

I assume that the instinct, at its earliest dawn, originated primarily in an unconscious way by the natural selection of chance favourable variations of unconscious habit, for it seems evident that a bird would find no just cause for any self-sacrificing attention to a hard uncomfortable object of which it has just ridded itself, and which we call an egg. And so Romanes has pointed out that the incubation instinct can only be explained as arising from the results of natural selection, and not as an action, originally intelligent, since stereotyped into mechanical instinct, as the reason why they sit could never have presented itself to the birds, for it would imply at least a scientific knowledge of the properties of the germinal area of the egg.

The majority of fishes, amphibians, and reptiles, from which latter, it must be acknowledged, our birds are derived, possess no parental instinct which is so remarkable a characteristic of the birds. But most animals possess that very elementary kind of parental instinct—typical of the insects—which informs them of the most suitable places for the dropping of their eggs.

Similarly, in ages long ago, the females of birds probably dropped their eggs at random in a variety of situations in more or less suitable localities on the ground. No special receptacle was made, but the eggs were laid in just those places where the female happened to be at the time of her accouchement; so that the eggs of a single female were scattered one by one over perhaps a wide area. These eggs, left with heartless nonchalance by the parents, would be hatched by the heat of the sun, or by inanimate substances. The young, at hatching, would be perfectly capable of looking after themselves. Possibly they would be able to fly within an hour or so.

In cold climates the sun would not be hot enough for the hatching of eggs, but at that time the eggs may have materially differed from those of to-day in the amount of heat required, while the two hemispheres may have been generally warmer, for even the Arctic Regions show abundant evidence of having been favoured—in the Cretaceous epoch, for example—with a hot climate and rich vegetable life. The gradual decline of this heat and the approach of Arctic conditions were no doubt instrumental in inducing parental affection and increasing the incubation duties. A few species which still resort to the heat of the sun now linger in the Tropics.

Many species in a fit of carelessness occasionally, even at the present time, drop their eggs on the bare ground and leave them, viz. many of the ground birds, *Molothrus vulgaris* and *Sturnus vulgaris*, and others.

These primitive birds, with little or no parental instinct, laid a very large number of large eggs.

The reason for this was that the risks to which the eggs were exposed were very great, and only a few of the embryos which happened to fall in with suitable circumstances would ever arrive at maturity. The eggs were large in order to contain the in-

creased amount of food-yolk necessary to enable the young birds to be hatched in an advanced stage of development, and fully equipped to fight the battle of life alone.

Lichenstein remarks that but for its numerous enemies the multiplication of the Ostrich would be quite unequalled, and it is a primitive bird with very little parental instinct.

The fact that the number of eggs varies, *ceteris paribus*, with the risks is well shown by the facts which are known to occur among fishes. The Herring (*Clupea harengus*) lays thousands of eggs—a fish which possesses no parental instinct, and whose eggs are exposed to all the dangers and vicissitudes of ocean life. The ova of the oviparous *Elasmobranchii* are comparatively few in number, as they are afforded very considerable protection by a tough, leathery, protective envelope. Fishes show a remarkable fecundity because they, unlike the birds, do not arrive at a permanent size. They grow continuously, and this causes the struggle for existence to be severer and the risks greater.

Birds in these remote times were probably to a great extent polygamous, or, at all events, a very loose sort of pairing obtained. As there was no need for any parental instinct or prolonged care of the eggs, the females and males, after copulation, had no reason to remain paired off; they had no severe mental tax laid upon them such as the care and training of young helpless birds entails, and were therefore open to sustain the demoralizing effect of promiscuous pairing. Possibly a large majority of the fishes are polygamous, and a sort of “panmixia” appears to occur among amphibians and reptiles of some species.

The Ostrich tribe and a great many of the *Gallinæ* are polygamous. The Ostrich (*Struthio camelus*) presents an interesting intermediate stage. She still lays an enormous number of eggs, but the male of the species, apparently, has begun to carry out the onerous duties of incubation. Though the species is still decidedly polygamous,* the females take a share in sitting; the male, however, does most of the work.† If the Ostrich were to make any intellectual advance, it would commence with the reduction of eggs and wives, and the increase in sexual and

* On this point cf. S. C. Cronwright Schreiner, ‘Zoologist,’ 1897, p. 115.—ED.

† Cf. *loc. cit.*, pp. 109–110.—ED.

parental affection. The offspring would probably be more vigorous.

The parental instinct of birds, once established, no doubt helped to produce the present complex condition of that reason and intelligent adjustment to surroundings which, without any danger of being called unscientific and anthropomorphic, I hold all birds incontestably display.

The elementary condition of the instinct which I have sketched was not a very permanent one. The females would find it an economy of energy in looking for suitable localities by always returning to the same spot, and so the eggs instead of being scattered would be laid in a clutch; or if in any district suitable localities were not numerous, the few localities that did exist would become overcrowded with eggs, and ground vermin and egg-eating birds would be attracted. This would threaten extinction, but the birds would respond by attempts, crude no doubt at first, at driving away their enemies and guarding the eggs. This would be the inception of the parental instinct. The male, being the more bellicose of the two sexes, would be the first to assume these watch-dog duties; moreover, should this species be an egg-eating one itself, the males would be forced to guard the eggs against their own females. To do this more successfully the male would collect his spouse's scattered products, and this again would result in the eggs being laid in a clutch, for the female, through the action of natural selection and her own enlightened intelligence, would not be slow to fall in with the male's domestic arrangements.

Another way of meeting these adverse circumstances and the onslaughts of enemies, but a way not adopted, was a further increase in the number of eggs—a tax on the organism as a machine, but not as an independent intelligence. In some such accidental atmosphere must have arisen the germ not only of the paternal instinct but of the whole of the bird's large and varied mental capabilities; for, like charity, intellect begins at home, and just as civilization is dependent on the relative perfection of the community, so the community is dependent on the condition of family life.

If only for their own convenience, when undergoing the ordeal of egg-laying, the females would tend to be secretive

over their nesting-site. They would choose quiet unfrequented nooks. Some would bury their eggs in the sand or under dense herbage.

The instinct which prompts the Turtle to leave its eggs in the sand to be hatched by the heat of the sun is in no point inferior to that of the Maleo of Celebes, whose method of nidification is precisely the same. This we may take to be a primitive case, and one where, in order to meet pressure imposed, natural selection chose to act on the sagacity of the female rather than on the pugnacity of the male. (Cf. p. 247, l. 18.)

The Brush-Turkeys (*Talegallus*) heap fermenting vegetable rubbish over their eggs, but show a slight superiority to the Maleo, for the male is said to guard the heap, which must certainly be a conspicuous object.

All the females of each polygamous male of primitive birds probably laid their eggs together in one large nest. This obtains with the *Talegallus*, *Struthio*, and others. This habit, like a great many other primitive though ingrained remnants of the history of evolution, still persists in cropping up as "sports" in a variety of birds. Audubon found three females of *Meleagris gallipavo* which had laid eggs in one and the same nest. They were sitting on forty-two eggs, so that each bird covered fourteen eggs. The American Rhea is not averse to making use of a neighbour's burrow in which to lay her eggs, and so with Pheasants, Partridges, Wild Duck, and Long-tailed Tits. The Game-birds and Plovers, Gulls, &c., sometimes, in thus reverting, make the mistake of laying their eggs in the nest not of one of their own but another species. Such an accident as this was undoubtedly the origin of the parasitic habits of the Cuckoo. A respectable, homely, and affectionate Cuckoo perhaps impulsively reverted to a nesting trait of her primitive ancestors by laying her eggs in the nest of an unsuspecting neighbour. When the species had generally commenced this retrogressive though luxurious method the nests of other species would have to be imposed upon, and so the well-known and parasitic habit of the Cuckoo would gradually be evolved.

Molothrus bonariensis, a parasitic bird, throws an occasional "sport." Several females begin to build an untidy, irregular nest of their own, in which they together lay as many as fifteen

to twenty eggs; otherwise this species is strictly parasitic (see Darwin in his chapter on "Instinct" in the 'Origin').

Of course, a large number of birds of the present day show a tendency to the primitive habit of leaving their eggs to hatch of themselves, *viz.* Emus, Grebes, Plovers, and others. Some cover their eggs when leaving them (*Anas boschas*, and others); others, again, only during the period before the whole clutch is laid, while the bird is not sitting, *viz.* *Parus major*, *P. cæruleus*. And so, the male jealously guarding the eggs, or, in some cases, the female carefully secreting them, would ensure the safe procreation of the species, and that species would ultimately win in the struggle for existence.

Though no one denies that Nature is profoundly extravagant, it is no contradiction of terms, and even more true to say that she is economical and thrifty too. No more eggs are laid by any bird than are necessary. With things at this juncture the necessity for so large a number of eggs would go, as the guarding male would eliminate so many of the risks. The reduction of eggs means an economy of food-yolk manufactured by the female, who would in turn receive an accentuation of vigour in some system other than her reproductive one. We must remember that Darwin's great principle of the struggle for existence is universal, and occurs even between the integrate parts of the same organism. In this case the nervous system benefits at the expense of the reproductive, while the young birds would undoubtedly be stronger and healthier. The production of healthier chicks would probably be the cause of a second lessening in the number of eggs, and this would again react on the young, and so on *ad infinitum*. Furthermore, the parents, instead of attempting to cope with an unwieldy number, would be able to give their undivided attention to the few chicks produced.

But there would be limits. Every species ought to send out into the world annually enough young, not only barely to carry that species through along its own narrow groove, which its heredity and environment have cut for it, but also enough young to allow of the expansion of its area of distribution and power to cope with change of pressure; for, under the rigorous action of

natural selection, a species must advance, or its extinction is simply a matter of time.

The stimulus to advance, *viz.* increased competition, would be responded to by the fact that a sufficient number of young would present a sufficient supply of variations, so that natural selection could grip the more favourable ones with sharper discrimination, and re-equip the species for its new environment.

By reason of the female laying her eggs in a clutch and the male guarding them, the attention of both parents becomes localized on the nesting-site. A proud sense of ownership possesses the male, and a stealthy secretiveness the female. It does not require great imagination to see that the step from guarding the eggs to sitting on them is not a long one. The male to escape a superabundance of attacks would attempt to make himself less in evidence. When an enemy came in view he would bob down on the eggs, and, finding them warm and comfortable, would continue to sit.

A curious fact is that among the birds, and even among the vertebrates generally, the male is generally the first to assume the responsibilities of domestic life. The male is the original mother. Consider the male's psychic qualities—he is the most vigorous, most pugnacious of animals, and the sex that courts, and, indeed, shows himself to be the most impressionable of birds. The female is passive.

Among the fishes, the male, almost without exception, is the only sex which shows any attachment to its eggs, and even then it is rather a piscine affection. It is the male Surinam Toad (*Pipa americana*) which carefully places the eggs on the back of the female. It is the male of *Rhinoderma darwini*, of Chili, who carries the female's eggs; it is the male of the Obstetric Frog (*Alytes obstetricans*) who assumes maternal duties, and twists the eggs round his hind limbs. Even among the invertebrates the maternal male is not unknown, *viz.* in the Pycnogonida. Among reptiles, however, it is apparently the female Python which sits on the eggs. Mammals, of course, produce substantial anatomical evidence of the male's former association with the female in suckling and in the care of the young. In the birds, of course, the males of *each species* in the *Ratitæ* incubate, while only in a few instances are the females allowed to have a

care in the eggs at all. And so it is with many other primitive birds. In the Bustard-Quails and Phalaropes, and one or two others, the male also does all the sitting, but this is not the primitive habit as developed in the Ostriches, because in the species I have named the female has taken on the characters of the male in every detail. She is larger in size, handsomer, and does all the courting, and she therefore assumes all the enjoyments as well as the hardships of that strange metamorphosis, and the male is left to sit.

With the bird there is no deep inevitable relation between the female and extreme development of the parental instinct. Present conditions, where the female is more generally the maternal parent, are the results of character and difference of temperament in the two birds, and of relative benefits. For example, in a species where sexual selection had already acted, it would be disadvantageous for the brightly-coloured male to sit if the nest were on the open ground, and so the female would take his place. Eggs laid in holes in rotten timber—probably a favourite locality with primitive birds—would require assiduous incubation because of the lack of heat, and it is obvious that this warmth would be amply provided if a division of labour occurred among the two parents. This division of labour would prevent any disastrous weakening effects in the male when he is forced to carry out all the incubation himself. The Spotted Emu (*Dromæus irroratus*), in captivity, has been known to sit for fifty days, during which time it took no food, and only left the eggs five times. The duties of incubation are burthensome at any time, and the males of many species drive their females on to the eggs, and *vice versâ*.

When once incubation became necessary, it was seen that the female was the more suited for it. It would suit the cock-bird more to stand by and fight. She would be acted on by various physiological changes; she would grow broody and want to sit of her own accord. As she grew more and more the sitting bird she would develop that keen sense of possession which would tend to create a somewhat mystic tie, as Prof. J. A. Thomson thinks, between the hen and her eggs. It is a fact well known to all that those hens which do not get broody lay more eggs than do those which frequently become broody. This fact

affords an illustration of the idea that birds with no parental instinct lay large quantities of eggs.

An extreme case of "physiological affection" is met with in the Emperor Penguin of the Antarctic Regions. The females are so filled with a desire to sit that, according to Capt. Scott, they line up behind a sitting female so as to be ready to take her place whenever she rises to leave the egg.

I wonder that more species have not adopted the happy-go-lucky and lazy method of the Owls in not waiting till the full clutch is laid before they sit. The females sit as soon as an egg makes an appearance. The benefits of this are clear as daylight. It lessens the labour of the parents in hunting for and providing food for five helpless young at once, while the incubation is cut short as the warmth from the bodies of the nestlings keeps up the incubation temperature of the unhatched eggs. Probably this is adopted more often than is usually thought. The eggs get buried beneath the young, and the observer, as a rule, is satisfied without lifting them to look beneath. I found Tree-Pipits', a Red-backed Shrike's, and Chaffinches' nests this year with eggs buried beneath well-developed young. The eggs hatched subsequently.

II.—OTHER ASPECTS.

Concurrently with the development of the incubation instinct arose the nest-building habit, the chief factors directing which probably were the personal comfort of the sitting bird first, then the protection of the young, and finally the æsthetic taste of the builders. If a female can choose and detect minute differences in form and colour of the males, surely she exercises those powers in the construction of her nest!

All birds were formerly ground-birds most probably. Most of the ground-builders of to-day do little else than breast a hollow in the sand or scrape one in the earth. Subsequently they were driven to the trees, or to holes in the earth and in timber.

When once the parental instinct had secured a firm foundation, and the ties between birds and their offspring became strong and close, all those remarkable tactics, such as the lame devices of the Ducks and Plovers, would be evolved. I

will not suggest that the Plover is fully conscious of the significance of her "lame assumptions," but in a case like this, if we lamely assume the habit to be a blind instinct, we are only raising a dust and then complaining that we cannot see. When Spencer calls instinct "compound reflex action" nobody is any the wiser, but if we accept that every instinct is mingled with "a little dose of reason," as Huber said, then the clouds lift. We understand, then, the relations between instinct and reason; reason and intelligence increase at the expense of instinct, just as inhibition gains control over reflex action, and in proportion with the growth of independent volition.

Nothing is more certain that when birds possessed no parental instinct the young hatched in an active condition, so that they were able to look after themselves; but when parental instinct had advanced sufficiently the young came to be born in a naked and helpless condition, for the male, having permanently acquired the habit of guarding the eggs, would next begin to guard the young birds that hatched from those eggs. And the result of this was that there occurred the possibility of the young hatching in a less developed state, and in a more or less helpless condition.

But the benefits that would accrue from this are not at first sight particularly obvious. Of course, when birds come to sit, smaller eggs would be a necessity, or otherwise the parents would be unable to cover the whole clutch; while extremely large eggs would take a long time to hatch and cause exhaustion to the sitting bird. Again, the reduction of the food-yolk would benefit the producer—the hen—and the young would become healthier.

Among those species where the helpless nestling chiefly obtains, it will be found that they are for the most part arboreal in their habits and great fliers. They are not runners or swimmers. Consequently the young do not possess any running or swimming ability, and the parents build their nests for the most part in trees. If their young, therefore, developed the temporary art of ambulation before the acquisition of the permanent power of flight, they would soon run over the edge of the nest and break their necks. If, on the contrary, they were hatched already with the power of flight, as is the case with the Megapode of Celebes,

the eggs would require to be large, which, as I have pointed out, would be an impossibility with incubating species.

Even admitting that the size of the egg may not be the all-important factor, and assuming that it is the precocious development of the nervous system, allowing of co-ordination of movement, which regulates the conditions of chicks at birth, there must still remain the objection that precocity does not ever mean physical strength, and five minutes' chat with a gamekeeper soon convinces one of the delicate susceptibilities of Grouse and Pheasant chicks. So it is necessarily an advantage to a bird capable of caring for them to produce a few—say, four or five—helpless though healthy young rather than a large number of delicate and precocious ones.

Superficially, it looks a convenience at least for any species to give birth to young able to look after themselves; but the chicks, for example, of the Partridge must run a greater number of risks than the parent, possessing at the same time *less ability to cope with them*. Consequently the Partridge has to produce as many as ten young at a brood, not because it has less parental instinct than the Thrush (who would assert that?), who produces four, but because its young are active and run into all kinds of dangers. Active young are really antagonistic to the parental instinct, and hence the advantages of helpless young to a species which has developed this instinct.

ADDITIONS AND CORRECTIONS TO THE 'INDEX ZOOLOGICUS' OF C. O. WATERHOUSE.

(SECOND SERIES.)

BY E. BERGROTH, C.M.Z.S.

IN my first series of additions to this work (Zool. 1905, pp. 63-67) about three hundred names were recorded; in this second series nearly two hundred and fifty further names are added. As in the first series, only names published before 1901 are included.

ADDITIONS.

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|---|--|
| Acantherpestes, <i>Scudder</i> , Myr., 1882. | Bradyaphis, <i>Mordvilko</i> , Hem., 1895. |
| Actinelius, <i>Haeckel</i> , Prot., 1865. | Branchiomma, <i>Claparède</i> , Verm., 1868. |
| Edeophasma, <i>Scudder</i> , Orth., 1885. | Calamoptera, <i>Saussure</i> , Orth., 1861. |
| Egyria, <i>Claparède & Lachmann</i> , Prot. | Calanus, <i>Saussure</i> , Orth., 1886. |
| Agrilium, <i>Westwood</i> , Col., 1854. | Calligorgia, <i>Gray</i> , Coel. |
| Agrionides, <i>Charpentier</i> , Neur., 1840. | Capulacmæa, <i>Sars</i> , Moll. |
| Alaurina, <i>Busch</i> , Verm. | Carabocera, <i>Ganglbauer</i> , Col., 1889. |
| Amphicosmus, <i>Coquillett</i> , Dipt., 1885. | Castanella, <i>Haeckel</i> , Prot., 1879. |
| Anandrus, <i>Menge</i> , Arachn., 1856. | Castanidium, <i>Haeckel</i> , Prot., 1879. |
| Anaxandra, <i>Stal</i> , Orth., 1877. | Castanissa, <i>Haeckel</i> , Prot., 1879. |
| Anisonema, <i>Dujardin</i> , Prot. | Castanopsis, <i>Haeckel</i> , Prot., 1879. |
| Anomalites, <i>Fritsch</i> , Col., 1884. | Cerambycites, <i>Deichmüller</i> , Col., 1886. |
| Anthobothrium, <i>Beneden</i> , Verm., 1849. | Ceriodaphnia, <i>Dana</i> , Crust., 1847. |
| Anthracoscorpio, <i>Kusta</i> , Arachn., 1888. | Cerosipha, <i>Guercio</i> , Hem., 1900. |
| Aphiodides, <i>Rondani</i> , Hem. | Chætosoma, <i>Claparède</i> , Verm., 1863. |
| Arabella, <i>Grube</i> , Verm., 1851. | Chamæsipho, <i>Darwin</i> , Crust., 1854. |
| Arantia, <i>Stal</i> , Orth., 1874. | Charnidas, <i>Stal</i> , Orth., 1875. |
| Arrhacia, <i>Herrich-Schaeffer</i> , Lep. | Choanotænia, <i>Raillet</i> , Verm. |
| Arrhostus, <i>Reuter</i> , Hem., 1884. | Chonionotus, <i>Jordan</i> , Myr., 1854. |
| Arthropleurion, <i>Goldenberg</i> , Myr., 1877. | Cicadinella, <i>Geinitz</i> , Hem., 1884. |
| Atrophopampus, <i>Townsend</i> , Dipt., 1892. | Cimicidium, <i>Westwood</i> , Hem., 1854. |
| Banza, <i>Walker</i> , Orth., 1870. | Cistelites, <i>Heer</i> , Col., 1865. |
| Belostomates, <i>Schöberlin</i> , Hem., 1888. | Clavigerus, <i>Szépligeti</i> , Hem., 1883. |
| Bematiscus, <i>Cope</i> , Mamm., 1892. | Clotenia, <i>Dohrn</i> , Pantop. |
| Bœhmia, <i>Hoek</i> , Pantop., 1888. | Colossendeis, <i>Jarzynsky</i> , Pantop. |
| Borana, <i>Dohrn</i> , Pantop. | Correbia, <i>Herrich-Schaeffer</i> , Lep. |
| Brachinites, <i>Fritsch</i> , Col., 1882. | Cosmophyllum, <i>Blanchard</i> , Orth., 1852. |
| | Cremodes, <i>Guenée</i> , Lep. |
| | Crinodes, <i>Herrich-Schaeffer</i> , Lep. |
| | Crithe, <i>Brady</i> , Crust., 1874. |

- Cyclocoris*, *Heer*, Hem., 1865.
Cycloderma, *Heer*, Col., 1865.
Cystostylus, *Whitfield*, Prot., 1880.
Davainea, *Blanchard*, Verm.
Decalopoda, *Eights*, Pantop.
Derocardia, *Saussure*, Orth., 1895.
Diacanthodis, *Walker*, Orth., 1870.
Dicæra, *Bell*, Dipt., 1888.
Dicyema, *Köl liker*, Prot.
Dileptus, *Dujardin*, Prot.
Dinophrya, *Bütschli*, Prot.
Diplophyllus, *Saussure*, Orth., 1859.
Dipylidium, *Leuckart*, Verm.
Discoptila, *Pantel*, Orth., 1890.
Dolichoglossus, *Spengel*, Moll., 1893.
Dysepicritus, *Reuter*, Hem., 1884.
Echinoderes, *Dujardin*, Verm., 1851.
Ectotrypa, *Saussure*, Orth., 1874.
Elatobia, *Herrich-Schaeffer*, Lep., 1853.
Eocicada, *Oppenheim*, Hem., 1888.
Epicharmus, *Stal*, Orth., 1875.
Eriococcus, *Targioni*, Hem.
Eriphyla, *Gabb*, Moll.
Euhadrocerus, *Reuter*, Hem., 1884.
Eunemertes, *Vaillant*, Verm., 1890.
Eupagurus, *Brandt*, Crust., 1851.
Eupolia, *Hubrecht*, Verm., 1887.
Euthemisto, *Bovallius*, Crust., 1887.
Fabellovena, *Oppenheim*, Hym., 1885.
Feronites, *Fritsch*, Col., 1884.
Flammulina, *Martens*, Moll., 1873.
Galerucites, *Oppenheim*, Col., 1888.
Gastrostomum, *Siebold*, Verm., 1878.
Geroneura, *Matthew*, Neur., 1889.
Gorgopis, *Menge*, Arachn., 1854.
Grylloderes, *Bolivar*, Orth., 1894.
Gryllomyia, *Seidl*, Orth., 1837.
Gyrinites, *Heer*, Col., 1852.
Hæmodipsa, *Tennent*, Verm.
Haptomerus, *Faust*, Col., 1889.
Hemidina, *Walker*, Orth., 1869.
Hersilioides, *Gourret*, Arachn., 1887.
Heteracis, *Dujardin*, Verm., 1845.
Hilarites, *Heer*, Dipt., 1856.
Homalostomum, *Beneden*, Verm.
Hormomya, *Mörch*, Moll.
Hypselodoris, *Stimpson*, Moll., 1855.
Ischnopoda, *Grandidier*, Orth., 1869.
Kampecaris, *Page*, Myr., 1856.
Karabidion, *Montrouzier*, Orth., 1855.
Lamiites, *Fritsch*, Col., 1888.
Lestoblattina, *Woodward*, Orth., 1887.
Leucotina, *Adams*, Moll., 1860.
Libellulites, *Charpentier*, Neur., 1840.
Libellulium, *Westwood*, Neur., 1854.
Ligyda, *Rafinesque*, Crust.
Limnochares, *Heyden*, Hem., 1862.
Lindia, *Dujardin*, Rot., 1841.
Lionotus, *Wrzesniowsky*, Prot.
Lipomyzon, *Cope*, Pisc., 1881.
Lithoplanes, *Scudder*, Col., 1886.
Lobeza, *Herrich-Schaeffer*, Lep.
Lobophyllus, *Saussure*, Orth., 1859.
Lophonotus, *Menge*, Myr., 1854.
Lophospira, *Whitfield*, Moll.
Lydella, *Dujardin*, Arachn.
Lyttonia, *Waagen*, Brachiop.
Macrostomum, *Schmidt*, Verm.
Mecynostomum, *Beneden*, Verm.
Mengea, *Grote*, Col., 1886.
Mesobætis, *Brauer*, Neur., 1889.
Mesoblattina, *Scudder*, Orth., 1885.
Mesoleuctra, *Brauer*, Neur., 1889.
Mesonemura, *Brauer*, Neur., 1889.
Mesoneta, *Brauer*, Neur., 1889.
Mesopsychoda, *Brauer*, Dipt., 1889.
Metaporcitus, *Costa*, Hem., 1834.
Methylla, *Hansen*, Dipt., 1883.
Microgryllus, *Philippi*, Orth., 1863.
Muceria, *Stal*, Orth., 1878.
Muscaria, *Giebel*, Dipt., 1846.
Myelophilus, *Eichhoff*, Col.
Nanthacia, *Scudder*, Orth., 1890.
Necropocus, *Scudder*, Neur., 1883.
Nectocarcinus, *Milne-Edwards*, Crust., 1860.
Neocles, *Stal*, Orth., 1875.
Neopallene, *Dohrn*, Pantop.
Newnhamia, *King*, Crust., 1855.
Ocnerites, *Oppenheim*, Lep., 1885.
Omalia, *Beneden*, Neur., 1867.
Ommatocarcinus, *White*, Crust., 1852.
Ophryocotyle, *Fries*, Verm.
Opisthophylax, *Menge*, Arachn., 1856.
Orophus, *Saussure*, Orth., 1859.
Orthosolenia, *Reuter*, Hem., 1884.
Oryctites, *Oppenheim*, Col., 1888.
Otiorrhynchites, *Fritsch*, Col., 1882.
Owenia, *Delle Chiaje*, Verm., 1842.
Oxyonyx, *Faust*, Col., 1885.
Pachnepteryx, *Brunner*, Orth., 1865.
Pachymeridium, *Geinitz*, Hem., 1880.
Palæocossus, *Oppenheim*, Lep., 1885.
Palæophlebia, *Brauer*, Neur., 1889.
Palæopocus, *Kolbe*, Neur., 1883.
Palenarthrus, *Scudder*, Myr., 1890.

- Palinostylus, *Bate*, Crust.
 Palotta, *Walker*, Orth., 1869.
 Panorpidium, *Westwood*, Orth., 1854.
 Paradoxoides, *Motschulsky*, Neur., 1851.
 Paramaya, *De Haan*, Crust.
 Paranemobius, *Saussure*, Orth., 1877.
 Parapleurites, *Redtenbacher*, Orth., 1889.
 Parattus, *Scudder*, Arachn., 1882.
 Parkeria, *Gabb*, Moll.
 Paræcanthus, *Saussure*, Orth., 1859.
 Patalene, *Herrich-Schaeffer*, Lep.
 Patiscus, *Stal*, Orth., 1877.
 Peliopelta, *Uhler*, Hem., 1886.
 Peribœa, *Philippi*, Pantop., 1843.
 Périphylla, *Steenstrup*, Cœl., 1837.
 Petaloptera, *Saussure*, Orth., 1859.
 Petaloptila, *Pantel*, Orth., 1890.
 Phenacohelix, *Suter*, Moll., 1892.
 Philobrya, *Carpenter*, Moll., 1872.
 Phlæopthiridium, *V. d. Hoeven*, Hem., 1849.
 Phragmatæcites, *Oppenheim*, Hem., 1885.
 Phryganeidium, *Westwood*, Neur., 1854.
 Phyllobothrium, *Beneden*, Verm., 1849.
 Physocypria, *Vávra*, Crust., 1898.
 Physoderes, *Westwood*, Hem., 1844.
 Pilumnopus, *Milne-Edwards*, Crust., 1867.
 Platyperla, *Brauer*, Neur., 1889.
 Primnoëlla, *Gray*, Cœl.
 Prionidus, *Uhler*, Hem., 1886.
 Procarabus, *Oppenheim*, Col., 1888.
 Prodytiscus, *Oppenheim*, Col., 1888.
 Progeotrypes, *Oppenheim*, Col., 1888.
 Prolystra, *Oppenheim*, Hem., 1888.
 Prorhynchus, *Schultze*, Verm., 1851.
 Proscorpius, *Whitfield*, Arachn., 1885.
 Pteromus, *Serres*, Hym., 1829.
 Ptychodon, *Ancey*, Moll., 1888.
 Rhabdogaster, *Metschnikoff*, Verm., 1866.
 Rhabpha, *Giebel*, Neur., 1856.
 Rhaphidium, *Westwood*, Neur., 1854.
 Rhipidorrhæbdus, *Oppenheim*, Hym., 1885.
 Rhizocera, *Kirk*, Hem., 1897.
 Rhizomaria, *Hartig*, Hem., 1889.
 Rhizophthiridium, *V. de Hoë*, Hem., 1849.
 Rhombogaster, *Dallas*, Hem., 1842.
 Rhynchothorax, *Costa*, Pantop., 1861.
 Saccocirrhus, *Bobretzky*, Verm., 1871.
 Sanna, *Walker*, Orth., 1870.
 Saurita, *Herrich-Schaeffer*, Lep.
 Scibia, *Burmeister*, Orth., 1838.
 Seniaulus, *Heyden*, Col., 1866.
 Sialium, *Westwood*, Orth., 1854.
 Silphites, *Fritsch*, Col., 1882.
 Siphonosphæra, *Müller*, Prot., 1858.
 Solenopus, *Sars*, Moll.
 Spongioderma, *Kölliker*, Cœl.
 Stenophylla, *Westwood*, Orth., 1845.
 Stictosynechia, *Reuter*, Hem., 1884.
 Stylarioides, *Claparède*, Verm., 1868.
 Subcallipterus, *Mordvilko*, Hem., 1894.
 Sybriacosoma, *Jacoby*, Col., 1895.
 Symydobius, *Mordvilko*, Hem., 1895.
 Synagoga, *Norman*, Crust.
 Syntomaptera, *Tepper*, Orth., 1893.
 Systemocerus, *Weise*, Col.
 Tedla, *Walker*, Orth., 1869.
 Tethneus, *Scudder*, Arachn., 1882.
 Theramenes, *Stal*, Orth., 1875.
 Timarchopsis, *Ganglbauer*, Col., 1889.
 Tineites, *Germar*, Neur., 1843.
 Tineites, *Kawall*, Lep., 1876.
 Tivia, *Walker*, Orth., 1869.
 Tricala, *Walker*, Orth., 1869.
 Trichopteridium, *Geinitz*, Neur., 1880.
 Trigænes, *Dohrn*, Pantop.
 Triodontia, *Williston*, Dipt., 1885.
 Tristichochæta, *Panceri*, Verm., 1878.
 Trocnada, *Walker*, Hem., 1858.
 Ululodes, *Currie*, Neur., 1899.
 Uronema, *Dujardin*, Prot.
 Velenovskya, *Fritsch*, Col., 1888.
 Wollastoniella, *Reuter*, Hem., 1884.
 Wollastonites, *Heer*, Col., 1865.
 Xerampelus, *Guercio*, Hem., 1900.
 Xestops, *Cope*, Rept.
 Zalmona, *Giebel*, Neur., 1856.

CORRECTIONS.

- for *Anthracothemma* read *Anthracothremma*.
 , for *Aristocarabus*, *Reitter*, read *Aristocarabus*, *Semenov*.
 , for *Brachycerus*, *Olivier*, 1889, read 1789.
 2, for *Brontes*, *Kugelann*, 1898, read 1798.
 9, omit *Clopterocoris*; it is recorded correctly on the same page as *Closterocoris*.
 86, omit *Cordolydon*; it is recorded correctly on the same page as *Cordylodon*.
 97, for *Cyrtodisea* read *Cyrtodisca*.
 103, for *Dermestoides*, *Herbst*, 1883, read 1783.
 120, for *Elasmocerus* read *Elasmocera*; for *Elateroides*, *Schneider*, 1892, read 1792.
 125, omit *Epactius*; it is a *nomen nudum*.
 131, for *Eucalypta* read *Encalypta*.
 196, for *Leptocala* read *Leptocola*.
 209, for *Macrosiphum*, *Æstlund*, 1886, read *Macrosiphum*, *Passerini*, 1860.
 303, omit *Probiscidoris*; it is recorded correctly on the same page as *Proboscidoris*.
 326, for *Rhaphidochila*, *Kerremans*, read *Rhaphidochila*, *Jakovleff*.

RECTIONS TO WATERHOUSE'S 'SUPPLEMENTARY LIST' (London, 1904).

- 4, for *Chondropsis* read *Chondropsis*.
 6, for *Hydropomorpha* read *Hydroporomorpha*.

CORRECTIONS TO SCUDDER'S 'NOMENCLATOR.'

- 98, for *Didynaozoon* read *Didymozone*.
 174, for *Leucastra* read *Lucastea*.
 195, for *Metoponia*, *Guenée*, 1852, read *Metoponia*, *Duponchel*, 1844.
 208, for *Nemobia* read *Nemobius*.
 326, for *Tridactylus*, *Latreille*, 1807, read *Tridactylus*, *Olivier*, 1789.

IS THE OKAPI IDENTICAL WITH THE "THAHASH" OF THE JEWS?

BY S. M. PERLMANN.

QUITE recently the January number (1904) of the 'Westermannsche Monatshefte' first reached my hands. My attention was at once drawn to an article by Georg Krause entitled "The Okapi; an Animal newly discovered in the Primitive Forests of Africa." As I had formerly read with interest in different newspapers some short notes and remarks regarding this new mammal, I attentively perused this publication, and became more convinced of what I had surmised long since, namely, that this animal, which is new with us, was already known to the Jews at the time of Moses under the name of "Thahash."

I consider my suggestion a probable one, but I fear I am very late (*post festum*) with it, and it would be very curious if nobody had thought of it till now; but, regardless of being too late, I will not shrink from compiling the arguments on which I base my views.

Before quoting the sources on which my suggestion is based, I consider it necessary to give some quotations from the article on the Okapi by Krause. There it is said (p. 465): "... Their [the aborigines'] information and scanty narratives were generally limited to the description of the Okapi as a zebra-like creature with a dark brown upper part of the body, and it has more than one hoof." Further (p. 466): "Now it became apparent that the Okapi is not a horse but a ruminating animal." And (p. 467): "The most interesting part of the skull of the Okapi, after all, is the forehead. There are three elevated spots to be perceived distinctly; two of them on those places where other animals have the horns, and the third one between the eyes, at the very centre of the root of the nose."

I will now adduce my arguments for the view that this animal is the same as is called in the Bible (Exod. xxv. 5, and

xxxv. 7) by the name "Thahash," and that the Talmudists most probably knew by tradition more or less about the qualities and conditions of the Okapi.

It is said (Exodus xxv. 3-5): "And this is the offering which ye shall take of them; gold, and silver, and brass, and blue, and purple, and scarlet, and fine linen, and goats' hair. And rams' skins dyed red, and 'Thahash' skins, and shittim wood." Luther and almost all Christian translators of the Bible translate the word "Thahash" by "Badger" (see notes by Kitto to the 'Illustrated Family Bible'; see also James Inglis's 'Bible Text Cyclopædia' and John Endre's 'Dictionary of the Holy Bible'); whereas most Hebrew translators left the word untranslated in due deference to the Talmudists, paying full attention to the doubts expressed by them in the Talmud. What really is to be understood by "Thahash"? The renowned Bible commentator "Rashi" has abstained in both verses in Exodus from giving any explanation whatever for the word; he merely quoted the Talmud: "This animal existed only at that time," or, to express the meaning of the Talmud more properly, "the animal existed only for that time and for this special purpose, namely, to be used as a cover at the Tabernacle."

We find the animal "Thahash" mentioned once more by the prophet Ezekiel (xvi. 10), "Vaenahlekh Thahash," and there it is translated by the same commentator, "Rashi," by "calzaite Taisson." But there is some reason for supposing that this translation does not originate from "Rashi," but was adopted from a marginal note, and it proceeds from the "Goluth Tehudah" (Venetia, 1612), by the Italian scholar, Leon Modena, who translated "Thahash" by "calzaited Tasso," as "Rashi" never contradicts himself, and never deviates from an interpretation once acknowledged by him as correct. Gesenius gives three translations for "Thahash": one as meaning to denote the colour of the skin (as the Septuagint and Vulgate make it in translating by "hyacinth colour"), being something like the colour of a dolphin; the second translation denoting the tanning and finishing of the skin, meaning "morocco-like"; and a third translation, to which Gesenius is inclined to agree, is an animal named "Thahash," and to be translated by "Badger" or "Dolphin." In the 'Encyclopædia Biblica,' edited by Canon Cheyne
Zool 4th ser. vol. XII.. July, 1908.

and Dr. Sutherland Black, besides the same translations as quoted by Gesenius, there are other ones, *viz.* sub 4, that "Thahash" means "Thaish" (Ram = he-Goat), which is considered by the editors as "less probable," because rams' skins, dyed red, are separately mentioned in the same verse under the name "alim"; and sub 5, what the editors consider as "most probable," is to be translated by "Egyptian leather." I cannot see the probability of this translation; it could be well applied in Ezekiel xvi. 10, in connection with "Vaenahlekh," which means, "I will attire ye with shoes of Thahash," but never could be applied in Exodus in connection with the word "oroth," which means "skins," and proves that the word "Thahash" connected with it means the name of the animal whereof the skin comes, like "oroth alim," meaning "skins of rams." The 'Jewish Encyclopædia' is inclined to take it as "wether skins," but I fully agree with the 'Encyclopædia Biblica' and call this translation "less probable," for the reasons mentioned.

I will now quote the descriptions of "Thahash" by the Talmud, and thus it will be seen that the "Okapi" is probably identical with the "Thahash" of the Bible.

'Talmud-Babli, Tractat Sabbath, 23 a: Rabbi Joseph, answering the question put before him whether the "Thahash" which was living at the time of Moses (*i. e.* an animal not known afterwards) was a clean or unclean one, says: "As to it, there cannot be even a question raised, as we are taught elsewhere that only skins coming from clean animals were permitted to be used for things destined for holy purposes."* This answer was objected to for the following reason: Rabbi Nehemiah has said, "There was in the Tabernacle one cover alike to 'Tala-elon' or 'Kala-elon' (which means 'Weasel' or 'Marten'), and these animals certainly are unclean ones; wherefore the explanatory answer from Rabbi Joseph, 'The cover only resembles in colour the said animals, but not the very skins of these unclean ones.'" To this Rabbi Joseph added: "Accordingly, the translation of 'Onkoloss' of the word 'Thahash' by 'Soss-gavna' is to be understood as of an 'enchanted colour.'" Further, 'Talmud-

* Clean animals are to be discriminated from unclean ones by the following marks: "Whatsoever parteth the hoof, and is cloven-footed, and cheweth the cud, among the beasts, that shall ye eat" (Leviticus xi. 3).

Bably, Tractat Sabbath,' 28 b: Rabbi Myer said, "The animal 'Thahash,' which lived at the time of Moses, was of a particular species, and the scientists were unable to decide whether it was a species of cattle or of wild beast. It had *one horn on its forehead*. It was discovered by Moses at that time. Moses had used its skin for the Tabernacle, and it disappeared afterwards." In 'Talmud-Jerusalmy, Tractat Sabbath,' p. 18, we find the following discussion: "What is to be understood by 'Thahash'? Rabbi Yehudah said 'Tainun'; it means the colour of the cover. Rabbi Nehemiah said 'Galaktania,' *i. e.* 'Weasel' or 'Marten,' of the skins of which the cover was made. All other Rabbis said it meant the name of the animal, and a clean animal." In 'Midrass Tanhoumah' (portion Troumah) we read: "Rabbi Yehudah said the 'Thahash' belonged to the section of clean animals; it was a big animal of the steppe, and had *one horn on its forehead*, and its skin was of six colours." It is evident that this Rabbi takes the translation of "Onkoloss" by "Sossjavna" as "sess" (six) "gavna" (colours). Rabbi Nehemiah said: "This animal was a miraculous creature; it was purposely created for the adornment of the Tabernacle, and as soon as its calling was fulfilled it was taken from the world." In 'Midrasz Koheleth' (paragraph 80) we find the following: "What is to be understood by 'Thahash'? Rabbi Yehudah said: 'Altania' (blue coloured); Rabbi Nehemiah said: 'Glaktania' (Weasel or Marten)."

From all this it is evident that the Talmudists, relying on traditions and religious precepts, considered the "Thahash" to be a clean animal—*i. e.* a ruminating one—with parted hoofs, and that it was of a beautiful colour and had one horn on its forehead. All these marks are found again on the recently re-discovered "Okapi," although it had since that time disappeared.

I add some remarks in my correspondence with the zoologist, Georg Krause, of Berlin:—I am sure that the Commentators who took "Thahash" (plural "Thoshim") as describing a certain colour (among them the Septuagint, the Vulgate, and Josephus, Antiq. iii. vi. i.) have erred like the others who translated it by "Badger" (Luther and most others),* or by "Dolphin" (Dr.

* It is worthy to be noted that Luther translated "Thahash" in Exodus xxv. 5, by "Badger," and in Ezekiel xvi. 10, by "morocco."

Julius Fuerst). The first translation (colour) is against the Hebrew grammar; if colour was meant it ought to be said "oroth metokhoshim," instead of "oroth Thoshim," like "oroth alim modomin," and in Ezekiel xvi. 10 it is quite unthinkable to take "Thahash" as a colour; and therefore those Commentators who strictly keep to the grammar, *e.g.* "Rashi" and "Eben-Ezra," have left the word untranslated, restricting themselves to the statement "Thahash" was an animal known at that time. The second translation, "Badger" or "Dolphin," is decidedly against the Jewish religious spirit of the time when the Tabernacle was erected. It would be preposterous to admit that Moses, at the same time when he dictated the severe precepts of "clean" and "unclean," should have chosen skins of unclean animals for the adornment of the Holy Tabernacle of God.

As a final and authoritative argument, I take the characters which are found alike in the "Okapi" as well as in the "Thahash"; they are both "ruminating," "parted hoofs" (which mark both as clean animals), and have a "horn-like elevation at the root of the nose" (which induced the Talmudists to speak of one horn)* "and the enchanting colour of the skin." There is no doubt that the "Thahash" was of a beautiful colour, otherwise its skin would have been dyed and coloured for beauty, as the rams' skins were dyed red (Exod. xxv. 5).

* And the imagination was used to construct "only one horn" of the elevation between the eyes, and to make the miraculous "Thahash" somewhat resemble the legendary miraculous bull, who was the first sacrifice of Adam. Of this bull, Rabbi Yehudah ('Talmud-Babli, Tractat Sabbath,' p. 28b), interpreting a verse in Psalm lxix., says, "The bull which was the first sacrifice of Adam had only one horn on his forehead."

NOTES AND OBSERVATIONS MADE DURING A CRUISE TO THE EAST ON BOARD THE 'VALHALLA' R. Y. S., 1907-1908.

BY GEOFFREY MEADE-WALDO, B.A., F.E.S.

I HAD the good fortune to receive an invitation to accompany Lord Crawford on his magnificent yacht, the 'Valhalla,' on a cruise to the Far East during the past winter, and it is hoped that a few remarks on things collected or observed may not be without interest.

In 'Three Voyages of a Naturalist,' by Mr. M. J. Nicoll, all that is necessary to explain the reason for such a prolonged cruise will be found; also a full description of the yacht herself. In the event, however, of there being readers who have not had the opportunity of seeing the book, I will briefly give the details. The 'Valhalla' is a full-rigged ship, and is in that respect unique among yachts; she is fitted with auxiliary and steam-power capable of a good average ten knots per hour. Her tonnage is 1490 tons, and, needless to say, she is fitted out in the most comfortable fashion, and is the *beau ideal* of a ship for cruising in the Tropics.

I joined the yacht at Cowes on Nov. 8th, but partly on account of a dense fog we were kept there until the 12th, and we did not actually leave the English coast until the 15th, being forced into Dartmouth and Falmouth before we were able to cross to Ushant.

I will now give briefly the extent of our cruise before going into details of any one place:—

Gibraltar, Nov. 19th-21st; Port Said, Nov. 29th; Cairo, Nov. 30th-Dec. 3rd; Aden, Dec. 11th-13th; Ceylon (Colombo), Dec. 24th-29th; Kandy, Dec. 29th-Jan. 3rd, 1908; Trincomalee, Jan. 8th-13th; Pulo Way, North Sumatra, Jan. 23rd; Singapore, Jan. 26th-31st; Johore, Feb. 1st-3rd; Borneo (Sarawak), Feb. 11th-14th. Malay Peninsula: Malacca, Feb.

18th; Port Dixon, Feb. 19th; Port Swettenham (expedition to Kwala Lumpur and Semangko Gap), Feb. 20th–23rd; Penang, Feb. 24th–25th; Pulo Way, Feb. 27th–March 3rd; Colombo, March 7th–12th; Aden, March 20th–21st; Suez, March 26th.

After entering the Mediterranean we went to Naples, and after a short stay there cruised to the Riviera, eventually getting to Gibraltar on April 26th, and to Cowes on May 3rd.

The greater part of the time available in port I spent in collecting insects. By this means a good number of specimens were obtained, including species of Lepidoptera, Hymenoptera, Diptera, Orthoptera, Coleoptera, Heteroptera, and Homoptera, the two first-named groups forming the bulk of the collection.

It is only natural that, when landing for the first time in a tropical country, one should feel quite overpowered by the wealth of life in every form, the consequence being that many objects of the greatest interest either pass unnoticed, or else, if noticed, only in the most perfunctory manner. It is entirely otherwise at sea, where almost everything that alights on board can be either captured or observed, and some creatures, seemingly of feeble flight, boarded us at considerable distances from the shore. Thus, a moth of the "Thorn" family and a "Snout" were seen on board far out at sea off the Algerian coast on Nov. 25th. A dragonfly, two small moths, two locusts, and a beetle joined us in the Red Sea, and when still over one hundred miles from Colombo a "Skipper" butterfly came on board. When rounding Dronga Head a butterfly (*Belenois taprobana*) appeared on deck, and again, when we were quite four hundred miles from Ceylon *en route* for Pulo Way, a Sphingid moth (*Chærocampa theylia*) was captured. In the Straits of Malacca I had quite an exciting evening (Jan. 25th), quite a number of large Cicadas boarding us and making a great noise as they flew up against the deck-awnings; two species of *Macroglossa* and other moths also came on board that evening, as well as a large beetle. We also had visits from birds—Larks, Chaffinches, and a Starling accompanying us in the Mediterranean to Port Said—and quite a number of spring migrants joining us on the journey home. House-Sparrows came on board when we were rounding Ushant, quite forty miles from land, on May 1st.

It would be tedious to go through the numerous delightful

excursions made during the cruise, for there were many such, but some account of our stay in Ceylon may be interesting. The first thing to attract the notice of a naturalist would assuredly be the number of Crows (*Corvus splendens*) and Brahmini Kites in Colombo Harbour. They are both invaluable scavengers, and consequently nobody thinks of disturbing them. The tameness of the Crows was extraordinary, and the ship's cat had a most tantalizing time with them, as they did everything but allow him to catch them. I never saw a Kite perched in the rigging, though they were constantly round the ship. The Crows would sit anywhere and everywhere.

From Colombo I made my first excursion into the jungle, accompanied by one of the sailors, a most interesting and helpful companion. I caught an early train to a place called Padukka, some twenty-five miles from Colombo, and from there we proceeded in a bullock-hackory towards Labugama, where are the reservoirs containing the water-supply for Colombo. The first thing of note was a large Rat-Snake, lazily sunning itself; they also are protected by the natives, being great destroyers of vermin.

Butterflies and a few day-flying moths were to be seen, among the butterflies the most noticeable being the stately *Ornithoptera darsius*, but they were flying at a great height, and were quite unapproachable. Many fine species were captured, including some beautiful members of the "Blue" family. Large arboreal wasp-nests were common, and many termite mounds were to be seen.

The well-known scarcity of life during the heat of the day in tropical countries was most emphatically manifested here—not a butterfly in the sun, and only a few on the wing seeking resting-places in the dense jungle—not a bird on the move; all retire till the burn of the midday sun has lessened.

We returned in time for dinner, and on changing my clothes I found several well-filled leeches adhering to my person, but have not suffered any discomfort from their presence. It was at this same place that I noticed a curious phenomenon on our return journey in March. A certain handsome day-flying moth (*Dichromia orosia*) was to be seen commonly among the thin scrub beneath the palm trees, but its flight was very erratic and

swift, making it almost impossible to capture. I then stood still for some time watching them, and noticed that every time they came to a palm tree they circled round and round the stem, mounting all the while, till an altitude of some fifteen or twenty feet was reached, and then reversing the action almost to the ground, when they would start off again on their mad flight until another palm tree appeared in the course, and then the same thing happened. By standing at the foot of a tree in a main line of flight I caught a number without any difficulty, though previously I had been unable to catch any.

We had a delightful visit to Kandy, the difference in elevation making a most noticeable change in the fauna. Kandy is a fine centre for collecting, the walks in the immediate neighbourhood are good, Lady Horton's Walk in particular being productive of fine "stick-insects" and "mantids," including the curious cobra-mantis. I visited this walk with a lantern one evening, and caught a number of moths, and was much struck by the number of flying phosphorescent insects which presented a most curious spectacle among the trees. On another occasion we went to a place called Haragama, about nine miles from Kandy, and situated near a fine river, a locality which is always good for insects, and on this river-bed we had very good reason to congratulate ourselves. Several large Sphingid moths (*Acherontia lachesis*) were poked out of the crevices of a gigantic banyan tree, and some magnificent Buprestid beetles were sunning themselves on another tree. Several species of larvæ were collected, including those of *Doleschallia basaltide*, one of the "leaf" butterflies, and *Talicada nyseus*, a very pretty little Lycenid butterfly, abundant round Kandy. The larva of this butterfly constructs quite a cocoon for its pupa.

From Kandy we all returned to Colombo to join the 'Valhalla' for a trip to Trincomalee. This place is indeed a naturalist's paradise, having, as it has, good collecting ground up to the water's edge. I noticed two things in particular at Trincomalee—one was the much smaller number of individual butterflies, though there was no apparent diminution in point of species; the other was the extreme abundance of *Menelaides hector* as compared with the western side of the island, where *Lærtias romulus* was much the commoner insect, though I only

saw an odd specimen at Trincomalee. *M. hector* swarmed all over the water as well as land, all, or nearly all, in fresh condition, and nearly all of them males. On an island in the fine harbour I managed at last to catch *Ornithoptera darsius* (male and female). The island proved a first-rate locality for many things, and especially Hymenoptera. We had here several comparatively unsuccessful hauls with the seine-net, but, as we were under the guidance of a native, it is more than probable that we were not shown the best localities. Fish were extremely abundant, and any morning one could see the native fishermen returning with well-filled baskets, containing everything from the Hammer-headed Shark to a fish no larger than a whitebait.

We returned to Colombo before proceeding further East, and after remaining a short time there started for Singapore, with a stop at Pulo Way, an island off North Sumatra, for coal *en route*. This island is a Dutch possession, and the coaling company a private one; the same company owns the floating-dock, into which we went on our return journey. This enabled us to spend several days on shore, and a number of nice captures were made. The common *Danais chrysippus*, most cosmopolitan of butterflies, and a species of *Euploea* were in countless numbers along by the sea, many of them sitting on the wet sand. Many coloured fish of every kind were swarming round the dock, and Sharks were plentiful in the harbour. We made an expedition to the mainland one day by the small local steamer, which takes about three and a half hours to do the crossing, following close in under the island for the first hour or so, a most interesting looking place. There were some fine Turtles swimming about in the vividly clear water. Oleleh, the port for Kota Raja, the capital of Achin, is not an interesting place, but Kota Raja itself is a nice little town right under the mountains in which the discontented Achinese dwell. Butterflies did not seem numerous, but moths were flying at some flower-beds in the public garden, amongst them *Chærocampa celerio*. The Sumatran Toad is apparently a very sophisticated creature, and we were much amused at the behaviour of certain individuals. The verandah where we sat after dinner was tenanted by several of them, each stationed under a lamp, and making a hearty meal off the insects

which fell to the ground after burning their wings or otherwise damaging themselves. It was interesting to note that a new-comer was instantly driven away by the old tenant, and had to wait about some distance away on the chance of something eluding his more happily placed rival. Moths and some nocturnal wasps of the genus *Dorylus* formed the majority of victims, and we saw one Toad eat at least a dozen wasps in a very short time.

After a short stay in Singapore, the next port of call, and a most delightful cruise round the island to Johore, we left on Feb. 8th for Borneo. We arrived at the mouth of the Sarawak River about noon on the 10th, but were unable to go up that day as the tide was low, so started up the following morning about ten o'clock, and thus had the scenery quite at its best. The nipa palm (than which, I believe, no finer palm exists, if size of frond is any criterion) and the mangrove were easily first in point of number, and there were several decaying tree-trunks covered with masses of orchids, many of them in full bloom. We anchored some miles below Kuching, the capital, the reason for this being that we should probably have difficulty in turning round further up. That evening many Monkeys came down to drink and wash by the river, bringing some quite young ones with them; they were no other than the curious Proboscis Monkey, which feeds on plants and roots growing in the mud. Another species of Monkey was common in the forest, and I saw several troops of them the following day. We were unfortunately unable to remain for long in this interesting place, and after calling again at Singapore, where I obtained two young Orang-utans, quite newly caught, we started up the Straits of Malacca, calling at several places on our way.

The yacht lay at anchor in the Klang River of Selangor, while I made an expedition to the central range of mountains, stopping in the Government rest-house at Semangko Gap. This place is at a considerable elevation, and the rest-house itself is on the very boundary between Selangor and Pahang, the division of the watershed being in the garden of the rest-house. The glorious scenery and wealth of life will ever live in my memory, and I am glad to think that I was able to make the most of my short visit, thanks to Mr. H. C. Robinson, of the Kwala Lumpur

Museum, who was also stopping in the house, and put his great local knowledge at my disposal. Cicadas making weird noises like penny trumpets, Pigeons "booming," and the melodious cry of the "Wa-wa," or Gibbon, were a few of the sounds to be heard.

On rejoining the yacht we started off to Penang, where the heat was intense. A short stay only was made there, and then on to Pulo Way, and so to Colombo, after which the trip, so far as collecting was concerned, was a thing of the past.

I regret to have to state that both the Orangs died before reaching Cowes, though one of them lived until Gibraltar was passed; but a charming little Gibbon, which Lord Crawford obtained in Borneo, came triumphantly through the changes of temperature, and is now in the Zoological Gardens, and in the very best of health.

NOTES AND QUERIES.

MAMMALIA.

Occurrence of the Grey Seal (*Halichærus grypus*) in the Mersey.—An adult male Grey Seal was shot in Paddington Lock, on the Woolston New Cut of the River Mersey, over two miles, by the river, above Warrington Bridge. It was driven into the lock and killed on June 17th, 1908. For two or three days before it was killed two Seals had been noticed between Atherston Quay and Warrington Bridge, and several unsuccessful attempts were made to shoot them. In order to reach the Cut the Seal must have ascended Howley Weir, Latchford, which it probably did at high tide. The animal, which I examined in the flesh, measured :—From nose to tip of tail, 7 ft. 6 in.; from nose to longest toe of hind foot, 8 ft.; length of fore flipper, 14 in.; length of index toe-nail, $2\frac{1}{2}$ in.; girth of body posterior to fore flippers, 4 ft. 8 in.; length of head, 14 in.; length of incisor teeth, $\frac{3}{4}$ in.; length of hind flipper, 15 in.; width of hind flipper, 18 in.; length of tail, 7 in. The teeth were not crowded, nor were they distinctly tuberculated; the nasal opening was typically large. Mr. T. A. Coward has seen the skin and skull, and confirms the identification; he has seen the Grey Seal off the coasts of Lley and Anglesey, where it has occurred on several occasions, and is of opinion that the species may breed on the North Wales coast. This is the second recorded instance of the occurrence of the Grey Seal in the Mersey, the previous one being in the winter of 1860–61, when one was captured in the Canada Dock, Liverpool (Proc. Liv. Lit. & Phil. Soc. xv. p. 134, 1860–61; Proc. Liv. Biol. Soc. iii. p. 263, 1888–9). The present specimen has been obtained for the Warrington Museum.—G. A. DUNLOP (Warrington Municipal Museum).

AVES.

Mimicking Song of Chiffchaff.—It may interest your correspondent, Col. H. Meyrick, to know that when at Bettws-y-Coed in April, 1905, I heard a very similar "combined" song. The bird began with a normal "chiffchaff," three or four times repeated, then suddenly

broke off into the Willow-Wren's descending scale, but always, before this was completed, the bird returned to the Chiffchaff's note, again three or four times repeated. It did this many times, but unfortunately I was unable to tell definitely whether it was a Chiffchaff or Willow-Wren, as it was up in the top of a tall willow tree. Could it possibly be due to intercrossing of the two species? The curious thing both about this bird and that observed by Col. Meyrick is that this combined song, if I may so call it, though slightly different in the two cases, was always repeated in exactly the same way. This seems to show that it was due not to any mimicking power but to some inherent peculiarity, such as might be produced by intercrossing.—J. S. HUXLEY (Balliol College, Oxford).

Muscicapa atricapilla in Ireland.—In Mr. E. P. Butterfield's interesting notes on the Pied Flycatcher (*ante*, p. 223) he says:—"It is locally common in some parts of Wales, and the same remarks are applicable to Yorkshire and Westmorland, but further north it becomes more scarce; whilst in Scotland it is a scarce breeding species, and in Ireland, where it was first recorded in 1875, it is still more so." In order to correct this misstatement of its breeding in Ireland, I beg to refer Mr. Butterfield to the 'Birds of Ireland,' where he will find that the bird has never been found breeding in this country; and since I obtained the first recorded specimen in April, 1875, only six others have been obtained, and all by my friend Mr. R. M. Barrington from lighthouse stations on the coasts of Kerry, Cork, and Wexford during the autumn migration.—ROBERT WARREN (Moy View, Ballina).

Ortolan Bunting at Plaistow, E.—I have much pleasure in recording a male Ortolan Bunting (*Emberiza hortulana*). It is in fine adult plumage, and was obtained by Mr. R. M. Presland, George Terrace, Beckton Park, on May 6th, 1908. I have had it preserved by Mr. E. Houghton, naturalist, Shrubland Grove, Dalston. I also wish to record a male specimen of the Woodchat-Shrike (*Lanius pomeranus*). It was shot at Camber, near Rye, by Mr. Thomas Sorrell, of Hastings, Sept. 15th, 1907.—J. A. CLARK (57, Weston Park, Crouch End, N.).

Cypselus melba at Lynmouth, North Devon.—My brother and I recently saw an Alpine Swift, between seven and eight p.m. It was flying at a low altitude over our house, flew along the sea-wall, and returned back over our heads; so we distinctly saw the grey under side. Our attention was drawn to it in the first instance by its size. There was a good deal of sea-fog at the time, and apparently it had lost its way.—T. H. BRIGGS (Rock House, Lynmouth).

Cuckoo's Eggs.—During a hurried visit which I paid to Mr. Thomas Jackson, 'Ship Hotel,' Overton, near Morecambe, on June 16th, he informed me that two Cuckoo's eggs had recently been found in the nest of a Meadow-Pipit, but with no eggs of the owner at the time these were found. One, however, was subsequently laid. He also let me see a Cuckoo's egg which had recently been found in the nest of a Sky-Lark built in the churchyard, and told me he has found the Cuckoo's egg in the nest of Greenfinch and Linnet, and also in the Ray's, Pied, and Grey Wagtail, Grasshopper- and Reed-Warbler, Tree-Pipit, Robin, and Redstart. He further informed me that during a forty years' experience of bird's-nesting he had never found a Cuckoo's egg in the nest of a Hedge-Sparrow, which coincides exactly with my experience in this district. Although the Whinchat is by no means scarce in the Overton district, Mr. Jackson knows of no instance of this species having been selected as fosterer, thus differing in this respect from many districts.—E. P. BUTTERFIELD (Bank House, Wilsden).

Peregrine Falcons and Buzzards in Cornwall.—During May and June I spent some of my leave in Cornwall, and went to my usual bird haunts. I am very pleased to be able to say that our two largest birds of prey keep up their numbers; in fact, the Buzzard is almost certainly increasing. I have visited two Peregrines' eyries, and have heard of two more, whilst a fifth couple had mated, but the male was shot by a well-known West Country farmer. In the spring of this year also two Falcons were shot near . . . by two local farmers within a short time of each other. The former bird shot was evidently a male, as on Sunday I saw the remaining bird alone, a very fine one, and, judging by size, a female. A resident also told me the bird has always been seen alone since the shooting affair, so she has evidently failed to find a mate. On June 14th I visited an eyrie which defied the efforts of some fishermen (so one told me) to get at the eggs. The Falcon flew out, screaming loudly. A pair of Buzzards were circling round at the time; one was immediately flown at by the Peregrine, and there was a very real collision. The larger bird stopped wailing, and flew away with all speed. Peregrines—especially the male bird—in stooping to Buzzards, generally avoid coming in contact by swooping above just without touching. Two of the eyries I consider safe now, as very few people know anything about them, but three eggs were taken by some fishermen from a more accessible nest. The usual price is five shillings each egg. Four were sold to a man two years ago for £1, and four more

were obtained just after he left. I have never known so many Peregrines nesting before. It is remarkable how they keep near the same locality year after year, though not the exact spot, doubtless owing to persecution. The pair I visited on the 14th had their eggs taken (four in number) last year, but through building about one hundred yards away this year are secure from egg-stealers. I know of two pairs of Buzzards building in woods, one wood being very small indeed. They have built in the same wood for about seven or eight years, but in the larger wood this is the first time. I climbed up to one, and found two very young birds and one egg unhatched in the middle of May. The remains of a rabbit were at the side of the nest. I have climbed up to the three different nests built by these birds during the above years many times, and have invariably found some portion of a rabbit in the nest. During this spring most of the tall trees in this wood have been cut down, including the one they built on last year, and now there are not more than three trees of sufficient size for the big birds to build upon. They have chosen one standing by itself. During this spring I have seen at least a dozen pairs of Buzzards. Many of their nests are inaccessible, so there is no likelihood of the bird being exterminated in Cornwall for many a long day to come. This is more than can be said of the much rarer Peregrine, both because of the destruction they do amongst the chickens and the keen demand for their eggs. Peregrines are distinguished as "Blue Hawks" by the local people, whilst Buzzards are called "Kits." Few sights give me so much pleasure as watching a pair of Peregrines. What marvellous powers of flight! They often stoop to Buzzards, their object being to drive them away, and will constantly fly at them till this result has been achieved. — H. P. O. CLEAVE (18, Leigham Street, Plymouth).

The "Drumming" of the Snipe. — In his valuable paper on the "bleating" or "drumming" of the Snipe, published in a late number of the 'Proceedings of the Zoological Society,' Mr. P. H. Bahr relates his observation, believing it to be new, that during the "bleating" the two outer tail-feathers are spread well in front of the other twelve so as to stand quite apart from them, and comes to the conclusion that by this means the "drumming" is produced. Perhaps I may be allowed to point out that I made a precisely similar observation many years ago (June, 1889) in Selkirkshire, and in a note sent to this Journal at the time (Zool. 1889, p. 315) recording the fact, suggested that it might have to do with the production of the sound. A sketch of the "drumming" Snipe which I made on the

spot agrees perfectly with Mr. Bahr's illustration. — WILLIAM EVANS (38, Morningside Park, Edinburgh).

Some Rare Kentish Birds. — It may perhaps be of interest to chronicle the facts relating to the Little Bustard (*Otis tetrax*) killed in the Isle of Thanet in 1902, as I do not think full details have ever been published. For about a fortnight prior to its death this bird was frequently observed in some fields adjoining Stone House School, Broadstairs, remaining in that district in spite of its being sadly persecuted by local sportsmen. On or about Dec. 20th, while shooting, Mr. Thomas Pemble happened to flush the Little Bustard from a field of swedes, and as it rose well within shot it was promptly killed. The specimen is still in Mr. Pemble's possession, where I have examined it. On Feb. 23rd of this year Mr. Wise shot a Fulmar (*Fulmarus glacialis*) off Kingsgate. This Petrel is extremely rare on the coasts of Thanet, and this is the first occurrence known to me. About a week or so earlier the same gentleman secured a Hen-Harrier (*Circus cyaneus*) in the livery of an immature male, also, I believe, from the neighbourhood of Kingsgate. From time to time Hoopoes (*Upupa epops*) are seen in Thanet, usually in the spring, and were they not almost invariably killed (for their peculiarly conspicuous plumage gives them practically no chance of escape) they would probably remain to breed. This spring one was seen in different private gardens round Westgate for about three weeks, but has now unfortunately disappeared, although I have not heard of it being shot. — COLLINGWOOD INGRAM (Westgate-on-Sea).

Birds which do not usually Perch. — When leaving Overton I crossed the fields to Morecambe, and whilst walking alongside a ditch I saw a Sky-Lark perched on a sallow tree, and when flushed off by my near approach it immediately settled on another sallow. I have never before seen this species perch on trees, except once on the Sussex coast near Hastings a few years ago, and once in this district we had one which had a nest near Bingley Wood, and frequently alighted on the top of a thorn-hedge previous to feeding its young. Soon after the arrival of the Wheatear this year I saw one perched on the top of a thorn-hedge, which is not a common occurrence here, and when walking over Stainburn Moor, near Harrogate, on June 10th, a Snipe was perched on one of the arms of the telegraph-posts, calling to its mate for a considerable time. I have known odd individuals of the Common Sandpiper perch with great facility in their nesting haunts when intruders are about their nests, or, even more, their young. — E. P. BUTTERFIELD (Bank House, Wilsden).

NOTICES OF NEW BOOKS.

The Senses of Insects. By AUGUSTE FOREL. Translated by
MACLEOD YEARSLEY, F.R.C.S. Methuen & Co.

THIS is a far more important publication than its title implies. It can in no sense be accepted as a purely entomological treatise, for it raises the primary question in animal psychology. Are instinct and reason distinct entities, or are they simply terms of a mental equation? Either the genus *Homo* has no connection with the evolution of other animals, and possesses a mental capacity underived and specially created, or otherwise his reason, though far beyond, is not inseparable from the instinct of other animals. This is a problem that can perhaps be neglected by the ordinary zoologist, but it cannot be avoided by the psychologist. Either all other animals than man are simply automata, or human intelligence is a derivative. As Dr. Forel remarks: "Language and books are crammed with words which are taken for things," and "reason" and "instinct" are words used to denote a fundamental difference while they only express items of a close relationship. This is not a conclusion of the materialist, but will be a postulate of the theologian in the near future.

Dr. Forel's book, however, is not a disputation but a store of observations, his study of the senses of insects is profound, and he adds many new facts of his own discovery. He also advises caution in the method by which we attempt to gauge the sensory impressions of other animals: "We have the bad habit of calling odoriferous substances (*Reichstoffe*) the substances which are odoriferous for us. But the study of all animals very quickly shows us that the differences between the animal species are enormous, that a substance may be extremely odorous for one species and not so for another, and *vice versâ*. The dog, whose sense of smell is of extreme delicacy for certain tracts that we are incapable of perceiving, is insensible to the scents which

affect us in the highest degree, &c. It is very quickly observed in insects that the faculty of perceiving certain emanations is intimately allied to their course of life, to their wants, and to dangers which they have to avoid. The female of each species is odorous to her male. A plant that attracts a certain insect from very far off leaves others indifferent, and is absolutely inodorous to us," &c. This argument strikes at the root of many of the generalisations now so frequently met with in popular bionomics.

This volume is a real addition to our knowledge, and not in an entomological sense alone, though no entomologist should neglect its perusal. Prof. Forel is not infallible; he is somewhat emphatic with those whose conclusions are not in agreement with his own, but he has nevertheless given us the best book on the subject.

Animal Life. By F. W. GAMBLE, D.Sc., F.R.S., &c.
Smith, Elder & Co.

THIS volume describes many phases of animal life, its subjects are of a selected nature, and it is written, as we are informed, from "the evolutionary standpoint"; from that standpoint the book must be read and appreciated. Evolution is a conception; it cannot be reduced to a formula, nor does it lend itself to the limits of a dogma. We can state facts that support it, and can find none that contradict it, but the most able evolutionist is the one who possesses the largest mental concept of the cosmic process, and not he who uses the most extensive terminology to express it. It belongs to no one science; it qualifies alike the thought and action of humanity as it accounts for man himself. The biologist, however, may be said to work under this conception; his facts are meaningless without it, his conclusions cannot escape it; the more he learns, observes, or discovers, a mighty hidden movement unfolds itself. Some devote their lives to the study of a single evolutionary manifestation, and in thus demonstrating a point not infrequently limit the conception of the whole. Dr. Gamble's book is a short sketch of a wide biological area; it is extremely suggestive, and gives an impulse to the evolutionary idea rather than adding to evolutionary

dogmas. The modern historian is now as much an evolutionist as the biologist, but his facts are more limited in time; he cannot precede man; the biologist goes back to a hoary antiquity.

Our space will not allow us to follow Dr. Gamble throughout. We will confine ourselves to his discussion on the colour of animals. His views on "sympathetic coloration in animals" is in the main what others have expressed by "assimilative" or "environmental" coloration. He gives some valid reasons against our regarding colour as produced solely for protective purposes. Observers have been led "to seek in protection the entire significance of cryptic colouring; to regard the avoidance of enemies or the near approach of prey as the reason for its existence; whilst to those who are not close observers the general vague resemblance between animals and their surroundings is illogically regarded as explicable for the same reason. But if we look back on the history of animal coloration . . . we realize that the pigments of animals are older than the effect they produce, and that the old nutritive, purifying, and respiratory uses of colour are the basis for the more recently evolved protective, warning, or mimetic values of coloration."

The volume is usefully illustrated, but the title 'Animal Life' has been already used by Jordan and Kellogg for a similar work published in 1901, and noticed in our volume for that year (p. 275).

EDITORIAL GLEANINGS.

IN celebration of the fiftieth anniversary of the famous joint communication by Charles Darwin and Alfred Russel Wallace, "On the Tendency of Species to form Varieties, and on the Perpetuation of Varieties and Species by Natural Means of Selection," a special meeting of the Linnean Society of London was held on July 1st at the Institution of Civil Engineers in Great George Street. The President of the Society, Dr. Dukinfield H. Scott, occupied the chair, and there was present a large and distinguished company representative of learned and scientific societies, as well as the Danish and Swedish Ministers, and the following members of the Darwin family:—Sir George and Lady Darwin, Dr. Francis Darwin, Major Leonard Darwin, and Mr. William Darwin. There were also present Dr. Alfred Russel Wallace, whose name is inseparably associated with that of Darwin in the great event which provided the occasion for

the celebration, and the venerable Sir Joseph Hooker, one of the two friends to whom Darwin first confided his epoch-making conclusions.

The President, in welcoming the delegates and guests, said that they were met to celebrate what was without doubt the greatest event in the history of the Linnean Society since its foundation. Nor was it easy to conceive the possibility in the future of any second revolution of biological thought so momentous as that which was started fifty years ago by the reading of the joint papers of Mr. Darwin and Dr. Wallace, communicated to the Society by Sir Charles Lyell and Sir Joseph Hooker. In Darwin's contributions the now classic term "natural selection" was used for the first time. In Dr. Wallace's paper the same idea was expressed with equal clearness. With both authors the key to evolution was at the same time the key to adaptation, and the great characteristic by which living things were distinguished. Darwin and Wallace not only freed us from the dogma of special creation—a dogma which we now found it difficult to conceive of as once seriously held—but they afforded a natural explanation of the marvellous indications of design which had been the great strength of the old doctrine; and themselves, with their disciples, added tenfold to the evidence of adaptation. Any new development of the doctrine of evolution must be prepared to face fairly and squarely the facts of adaptation. He was proud to welcome, on behalf of the Linnean Society, the illustrious gathering which had assembled to commemorate an event so unpretentious in its circumstances, so profound in its significance. The presence of Dr. Wallace, one of the two creators of the theory, and of Sir Joseph Hooker, who brought it into the world, was in itself enough to render the meeting memorable. While regretting the absence of Prof. Weismann and Prof. Haeckel, those valiant champions of evolution, he rejoiced to welcome Prof. Strasburger, who represented in the present day the great school of Hofmeister, who helped to make straight the way for 'The Origin of Species.'

The ceremony of presenting the special Darwin-Wallace medals was then entered upon.

In making the presentation first to Dr. Alfred Russel Wallace, the President said that Dr. Wallace's brilliant work both in natural history and geography had often received distinguished recognition. In asking him to accept the first Darwin-Wallace medal, the Linnean Society was really offering him his own. There was nothing in the history of science more delightful or more noble than the story of the relations between Darwin and Wallace—the story of a generous rivalry in which each discoverer strove to exalt the claims of the other. It was a remarkable and momentous coincidence that both should have independently arrived at the idea of natural selection after the reading of Malthus's book, and it was a most happy inspiration that Dr. Wallace should have selected Darwin as the naturalist to whom his discovery should be communicated. Like Darwin, Dr. Wallace was, above all, a naturalist, a student, and lover of living animals and plants. It was to such men—those who had learnt the

ways of Nature in the open—that the doctrine of natural selection especially appealed, and therein lay its great and lasting strength.

Dr. Wallace, who was very cordially received on rising to respond, said that since the death of Darwin in 1882 he had found himself in the somewhat unusual position of receiving credit and praise from popular writers under a complete misapprehension of what his share in Darwin's work really amounted to. It had been stated not infrequently in the Press that Darwin and he discovered natural selection simultaneously, while a more daring few had declared that he was the first to make the discovery, and that he gave way to Darwin. To avoid further errors it would be well to give the actual facts. The one fact that connected him with Darwin was that the idea of "natural selection" or "survival of the fittest," together with its far-reaching consequences, occurred to them both independently. But what was often forgotten was that the idea occurred to Darwin in October, 1838, nearly twenty years earlier than to himself, and that during the whole of that twenty years Darwin had been laboriously collecting evidence and carrying out ingenious experiments and original observations. As far back as 1844, when he (Dr. Wallace) had hardly thought of any serious study of nature, Darwin had written an outline of his views which he communicated to his friends Lyell and Hooker. The former strongly urged him to publish his theory as soon as possible lest he should be forestalled, but Darwin always refused till he had got together the whole of the materials for his intended great work. Then at last Lyell's prediction was fulfilled, and without any apparent warning his (Dr. Wallace's) letter reached Darwin like a thunderbolt from a cloudless sky. How different from this long study and preparation, this philosophic caution, this determination not to make known his fruitful conception till he could back it up by overwhelming proofs, was his own conduct! The idea came to him, as it came to Darwin, in a sudden flash of insight. It was thought out in a few hours, and was written down with such a sketch of its various applications and developments as occurred to the mind at the moment. Then it was copied on to letter paper and sent on to Darwin, all in one week. He was the young man in a hurry; Darwin was the painstaking and patient student. Such being the facts, he should have had no cause of complaint if the respective shares of Darwin and himself had thenceforth been estimated as roughly proportional to the time that each had bestowed upon their theory when it was first given to the world—that was to say, as twenty years was to one week. If Darwin had listened to his friends and had published his theory after ten years, fifteen years, or even eighteen years' elaboration of it, he would at once have been recognized, and should ever be recognized, as the sole and undisputed discoverer and patient investigator of the great law of "natural selection" in all its far-reaching consequences. It was a singular piece of good luck that gave him any share whatever in the discovery. During the first half of the nineteenth century many great biological thinkers and workers had been pondering over the problem, and had even suggested ingenious but inadequate solutions. Why did so many of the greatest

intellects fail while Darwin and he hit upon the solution? A curious series of correspondences both in mind and in environment led Darwin and himself, alone among their contemporaries, to reach identically the same theory. First and most important, in early life both Darwin and he became ardent beetle-hunters. There was no other group of organisms that so impressed the collector by the almost infinite number of its specific forms, and their innumerable adaptations to diverse environments. Again, both Darwin and he had "the mere passion of collecting," an intense interest in the mere variety of living things. It was this superficial and almost childlike interest in the outward forms of living things which happened to be the only one that could have led them to a solution of the problem of species. It was the constant search for and detection of often unexpected differences between very similar creatures that gave such an intellectual charm and fascination to mere collecting, and when, as with Darwin and himself, the collectors were of a speculative turn of mind, they were constantly led to think on the why and the how of this overwhelming, and at first sight purposeless, wealth of specific forms among the very humblest forms of life. Then a little later both Darwin and he became travellers and observers in some of the richest and most interesting portions of the earth, and thus had forced upon their attention all the strange phenomena of local and geographical distribution. Thenceforward the mystery of how species came into existence began, in Darwin's phrase, "to haunt" them. Finally, both Darwin and he, at the critical moment when their minds were freshly stored with a considerable body of personal observation and reflection bearing on the problem to be solved, had their attention directed to the system of "positive checks," as expounded by Malthus in his 'Principles of Population.' The effect of this was analogous to that of friction on the specially prepared match, producing that flash of insight which led them immediately to the simple but universal law of the "survival of the fittest" as the long-sought effective cause of the continuous modification and adaptation of living things. He attached much importance to the large amount of solitude which he and Darwin enjoyed during their travels, and which gave them ample time for reflection. This view of the combination of certain mental faculties and external conditions that led Darwin and himself to an identical conception also served to explain why none of their precursors or contemporaries hit upon what was really so very simple a solution of the great problem. He accepted the crowning honour conferred upon him that day as a too liberal recognition of the moderate amount of time and work he had given to explain and elucidate the theory, to point out some novel applications of it, and extend those applications even in directions which somewhat diverged from those accepted by his honoured friend and teacher—Charles Darwin.

The President, in presenting the medal next to Sir Joseph Hooker, said it was with profound pleasure that they welcomed one whom Darwin fifty years ago wrote of as "our best British botanist, and perhaps the best in the world," words which had gained in force with

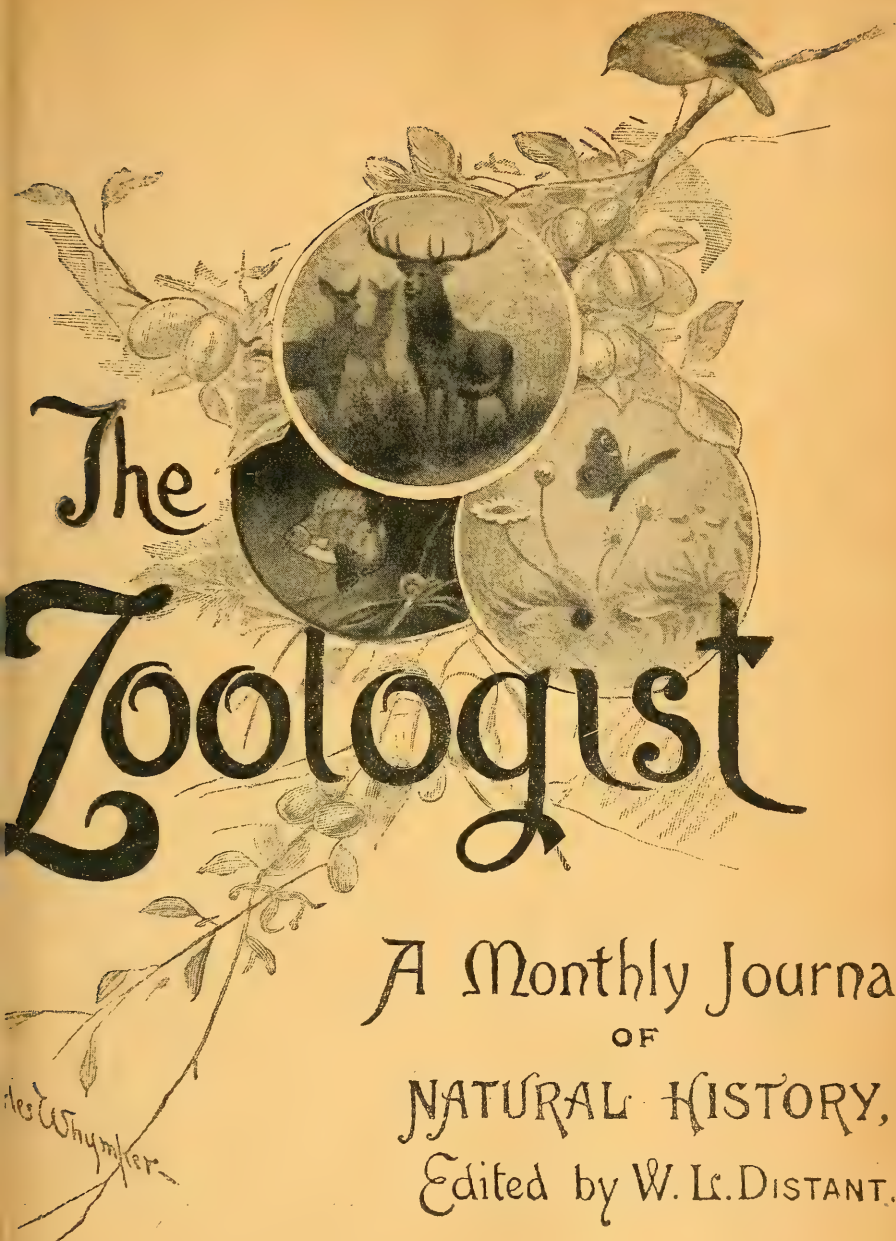
the half century that had elapsed since they were written. Sir Joseph Hooker's early appreciation and unswerving support of a doctrine too often misunderstood did more than any other circumstance to ensure a fair hearing among true men of science for the theory of the origin of species by means of natural selection, leading ultimately to its general acceptance.

Sir Joseph Hooker, who was loudly cheered on responding, said that, considering the intimate terms on which Mr. Darwin extended to him his friendship, he thought that on that occasion it would be appropriate if he could from his memory contribute to the knowledge of some important event in Darwin's career. He had selected as such an event one germane to this celebration, and also engraven on his memory—namely, the considerations which determined Mr. Darwin to assent to the course which Sir Charles Lyell and he suggested to him—that of presenting to the Society, in one communication, his own and Mr. Wallace's theories on the effect of variation and the struggle for existence on the evolution of species. They had all read Francis Darwin's fascinating work as editor of his father's 'Life and Letters,' where they found a letter addressed on June 18th, 1858, to Sir Charles Lyell by Mr. Darwin, who stated that he had that day received from Mr. Wallace, written from the Celebes Islands, a sketch of a theory of natural selection as depending on the struggle for existence so identical with one he himself entertained, and fully described in MS. in 1842, that he never saw a more striking coincidence. After writing to Sir Charles Lyell, Mr. Darwin informed him (the speaker) of Mr. Wallace's letter explicitly announcing his resolve to abandon all claim to priority for his own sketch. He (the speaker) could not but protest against such a course, no doubt reminding him that he had read it, and that Sir Charles knew its contents some years before the arrival of Mr. Wallace's letter, and that the withholding of their knowledge of its priority would be unjustifiable. He further suggested the simultaneous publication of the two, and offered, should Mr. Darwin agree to such a compromise, to write to Mr. Wallace, fully informing him of the motives of the course adopted. In answer Mr. Darwin thanked him warmly for his offer to explain all to Mr. Wallace, and in a later letter stated that he was disposed to look favourably on the suggested compromise, but that, before making up his mind, he desired a second opinion as to whether he could honourably claim priority, and that he proposed applying to Sir Charles Lyell for this. It might be interesting to recall that the last ordinary meeting of the session of the Linnean Society was held in the middle of June. The occasion of the meeting on July 1st was exceptional, being due to the death of the eminent botanist, Robert Brown. As a mark of respect to that great past President, the ordinary meeting of June 17th was adjourned, and a special meeting called in order to elect a successor to the vacancy on the Council caused by his decease, George Bentham being nominated in his place. The usual election of Council and officers had taken place at the anniversary meeting only a month before, and, oddly enough, among the new members of that body was Charles Darwin. Other papers

were read at the special meeting of July 1st, but the whole correspondence relating to the two papers on the evolution of species was subsequent to June 17th; indeed, the joint letter from Sir Charles Lyell and himself communicating them to the Society was only written on June 30th. Thus the death of Robert Brown was the direct cause of the theory of the origin of species being given to the world at least four months earlier than would otherwise have been the case. He concluded by asking their forgiveness for intruding upon their time and attention with the half-century old, real, or fancied memories of a nonagenarian as contributions to the history of the most notable event in the annals of biology that had followed the appearance, in 1735, of the '*Systema Naturæ*' of Linnæus.

Lord Avebury wound up the proceedings with some recollections of Darwin, with whom his acquaintance began more than sixty years ago. In the parish of Down Mr. Darwin was much beloved. He was rather a puzzle, no doubt, to the villagers. One of his friends once asked the gardener how Mr. Darwin was. "Oh," he said, "my poor master has been very sadly"; and added confidentially: "I often wish he had something to do. I have seen him stand doing nothing before a flower for ten minutes at a time. If he only had some regular work I believe he would be much better." He received the highest honours from the Royal Society and the Institute of France, and in both cases '*The Origin of Species*' was expressly excluded from the award. This was remarkable in two ways. It showed that even apart from '*The Origin*' his other work was entitled to the highest scientific recognition; and if we are now astonished that '*The Origin*' should have been excluded, we must remember the novelty of the views propounded. In fact, almost all—one might say all—authority was against him. At first, with few exceptions, not only the theological but even the scientific world was against him. A few years of study and reflection changed all this. It has changed also the religious dread with which his conclusions were received, and Mr. Balfour told us a few days ago that he looked to science as the great influence which was to raise and improve the condition of man.

[As the Official Report of the Linnean Society has not yet been published, we have relied on the reports given by the '*Times*' and '*Daily Telegraph*.' We have also to thank Mr. B. Daydon Jackson, the General Secretary of the Society, for considerable kind assistance.]



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THE ZOOLOGIST

No. 806.—*August, 1908.*

PRICES OF ANIMALS: 1896–1908.

BY CAPT. STANLEY S. FLOWER,

Director of the Giza Zoological Gardens, Egypt.

THE prices at which wild animals change hands in Europe may perhaps at first sight appear a matter of little zoological interest, but a record of these may in time be of historical importance as helping to show the relative abundance and ease or otherwise of importing and breeding many species of mammals and birds which are already (or unfortunately appear in the near future to be) doomed to extinction from various causes.

A record of the prices paid a century, or even sixty years, ago would now be of decided value. It is chiefly for this reason that the present list has been compiled; but the reader must bear in mind that it is of necessity very incomplete, being limited to my own personal experiences: my hope is that its publication may induce other zoologists, who may have had greater opportunities, to place on record the prices which have come to their notice.

For convenience of comparison I have limited the prices quoted to the last twelve years, 1896 to 1908, and in each case the prices are (unless otherwise stated) those for delivery in the principal cities of Western Central Europe, such as London, Liverpool, Marseilles, Rotterdam, Hamburg, &c.

Besides being perhaps of zoological-historical interest, these

notes may possibly also be of present use to professionals and amateurs. But it must be remembered that the values in wild animal dealing vary probably more than in any other trade, in accordance with supply and demand; if, for instance, an individual or an institution wants to buy a Lion at short notice, and no one is wishing to sell, they may have to pay some hundreds of pounds for an animal that at another time its owner would be willing to part with for practically nothing in order to save the daily cost of keeping it supplied with food.

“Fancy” prices are not included in these notes, though in actual trading one is at times quite ready to pay them, or at any rate to “allow” for them: as it is a curious fact that the general public that will crowd to see, and will *pay* to see, a Tortoise that they hear has cost a hundred golden sovereigns, will take no interest in the same reptile should it have been known to have changed hands for a ten pound cheque!

The amateur must not expect to be at all times able to buy beasts or birds for the prices mentioned below. These are, to the best of my knowledge, all genuine prices, either of actual business transactions or of offers to sell: but, as in many cases the offers are of surplus stock, the prices are below the actual values of the animals named.

In some years' experience, in three continents, both as a buyer and a seller of wild animals, and also in the capacities of an intermediary and a looker-on, I have been unable to help noticing the tendency, both of many amateurs and also of the salaried officials of some zoological institutions, to beat down and decry the prices asked for specimens by the professional zoological collectors and dealers: this is a regrettable and short-sighted policy. In the long run, and taking all risks into consideration, the pecuniary profits on zoological trading are very small—if any. In most cases the collector and dealer carries on his work, not from the money that accrues to him from it, but from the fact that it is the only way in which he can afford to gratify his love for, and his interest in, zoological pursuits.

There are people in Europe who say, “What an exorbitant price to ask for a dead butterfly,” or who write, “An absurd sum to pay for a young Elephant”: but if these same people could only realize the accumulated experience required, the

trials to health and patience, the expenses and the trouble incurred by the professional collector in the jungles of Borneo, or in the swamps of Central Africa, to make it possible for them to have the chance of obtaining the desired specimen, they *should* be willing not only to give the price asked, but more also "for the good of the cause."

The order in which the animals are enumerated, and the names used for them, are, for convenience of reference, as far as practicable, in accordance with Dr. P. L. Sclater's 'List of the Vertebrated Animals now or lately Living in the Gardens of the Zoological Society of London,' 9th edition, 1896.

The prices throughout are quoted in pounds sterling, or where necessary shillings.

Class MAMMALIA.

Order PRIMATES.

Family SIMIIDÆ.

The prices at which Anthropoid Apes change hands are most variable, so much depends on the health and probability of life of the animal. £100 may be asked for a Chimpanzee, which some days later may be only worth the price of its uncleaned skeleton.

£40 to £75 may be taken as the value of a healthy young Chimpanzee in Europe.

I have never been offered the chance of buying a Gorilla, nor of an Orang-utan or a Gibbon (in Europe), so cannot quote any prices. On the Suez Canal one sometimes gets exceptional opportunities; I once purchased a nearly full-grown male Orang-utan for £6, and at another time a young female for £14.

Family CERCOPITHECIDÆ.

Newly imported Monkeys of the commoner and smaller species of this family may be frequently purchased for from fifteen shillings (or even less) to £1 each.

Of the genus *Semnopithecus* (or *Presbytis*), practically the only species that is imported at all regularly to Europe is the Entellus or Hanúmán Monkey, best known as the Langúr: on arrival they may be bought for £2 apiece, but I have no doubt that a really acclimatized specimen, if put up for sale, would fetch a much higher price.

For our present purposes the genus *Cercopithecus* may be roughly divided into four sections:—

1st. Value £1 to £1 10s. or £2 each:—

The Grivet-Vervet Monkeys, *C. cynosurus*, *griseo-viridis*, *callitrichus*, *lalandii*, and *pygerythrus*: and Sykes's Monkey, *C. albigularis*.

2nd. Value £2 10s. to £3 each:—

C. petaurista, *nictitans*, *cephus*, *talapoin*, *patas*, and *mona*.

3rd. Value £3 10s. to £6 each:—

C. diana, *schmidti*, *wolfei*, and *campbelli*.

4th. Value £6 and upwards:—

C. neglectus (or *brazzæ*); particularly fine individuals of the more showy species, mentioned in the 2nd and 3rd sections; and examples of newly described species.

Cercocebus fuliginosus, the Sooty Mangabey, may be bought at from £1 or £1 10s. to £3 or £3 5s. each, according to size.

C. collaris and *C. æthiops*, the only other Mangabeys at all frequently imported, for from £2 to £3 each.

Of the genus *Macacus*, there are three species which are brought from Southern Asia to Europe in enormous numbers, and can be bought for from fifteen shillings up to £2 each. These are: the Bonnet Monkey, *M. sinicus*; the Common Macaque, Kra, or Jew Monkey, *M. cynomolgus* (now generally called *M. fascicularis*); and the Rhesus or Bandar, *M. rhesus*.

The Pig-tailed Monkey, or Broh, *M. nemestrinus*, is also frequently imported; small specimens are generally sold for £1 each, adult males for as much as £5 each.

Other species of *Macacus* comparatively seldom enter the market: the only notes (for Europe) I have are:—

M. silenus, Wanderoo. £7 10s.

M. maurus, Moor Macaque. £3 15s.

M. rufescens, Reddish Macaque. £5.

M. inuus, Barbary or Rock Ape. £4.

The Black Ape of Celebes, *Cynopithecus niger*, is not often to be obtained: young individuals have been offered at £3 each.

The true Baboons, genus *Cynocephalus* (or *Papio*), for trade purposes fall at once into two sections:—

1st. The Chacma, Anubis, Doguera, Sphinx, Yellow, and Arabian Baboons: which can be obtained from £2 each and up-

wards. Females and half-grown males are worth £4 to £6 each; large males £8 to £12, £15 or £20, according to size and condition. £25 is the highest sum that I have been asked for an Anubis Baboon in Europe.

2nd. The Drill and the Mandrill: quite young examples of these showy animals can exceptionally be obtained for £3 each, but £4 to £7 each is a more usual value. Adult males at times fetch very high prices, £50 to £100, and I believe even more.

Family CEBIDÆ.

The common species of Capuchin, or American "Ringtail," Monkeys, *Cebus fatuellus*, *capucinus*, and *hypoleucus*, are generally worth about £2 each.

The only other Monkeys of this family that I have been offered are:—

Chrysotrrix sciurea, Squirrel Monkey. £3 10s.

Ateles paniscus, Red-faced Spider Monkey. £5.

A. ater, Black-faced Spider Monkey. £3 and £5.

Lagothrix humboldti, Humboldt's Woolly Monkey. £15.

Nyctipithecus vociferans, Douroucouli. £2.

Family HAPALIDÆ.

The common Marmosets, *Hapale jacchus* and *H. penicillata*, sell from £1 to £2 each.

Family LEMURIDÆ.

During the last five years an enormous number of Lemurs have been imported into Europe from Madagascar, and their values have greatly decreased. The Black and White Ruffed Lemur, *Lemur varius*, may be still worth £3 or more, but the Black Lemur, *L. macaco*, the common Brown Lemur, *L. fulvus* (*L. brunneus* of Sclater's list), and the Ring-tailed Lemur, *L. catta*, only from £1 10s. to £2 apiece.

The Mouse-Lemurs, *Microcebus*, may be purchased from £1 upwards, and the "Bush-babies," *Galago*, from £2 to £3.

I once bought a Bosman's Potto, *Perodicticus potto*, from a Hamburg dealer for only £3 10s., and I have recently been offered in the same city an Aye-aye, *Chiromys madagascariensis*, for £45.

Order CARNIVORA.

Family FELIDÆ.

Felis leo.—Contrary to popular opinion, Lions are of little value, compared to the cost of their feeding. Wild bred, imported animals, in good condition, are worth from £60 to £100. Menagerie-bred Lions sell for smaller sums; one Zoological Gardens was offering cubs for £10 each in 1907. The smallest sum I have ever been offered a live Lioness for, in Europe, was £3 15s.; the largest sum I have seen asked for a Lion was £250.

F. tigris.—Tigers and Tigresses are worth far more than Lions and Lionesses. The range of price also appears to be much smaller: my notes give £100 to £125 for Tigers, £75 to £112 for Tigresses.

F. pardus.—Spotted Leopards, African or Asiatic, male or female, are of about equal value. £35 is the highest figure I have seen an individual Leopard valued at. Ordinary good specimens are worth £25 to £30 each, but in order to clear surplus stock they are often quoted at from £15 to £20; cubs even for less. £10 is the lowest figure I have noted in Europe.

Black Leopards are worth considerably more than Spotted ones: I have not sufficient data to give exact figures, but perhaps their value may be taken as three times that of Spotted Leopards.

F. uncia, Snow-Leopard or Ounce.—£75 to £150 each, asked.

F. nebulosa.—The Clouded Tiger I have only once noted in a trade-list: £50 was asked for a three-year-old female with damaged lower canine teeth.

F. temmincki, Golden Cat.—£10 (once).

F. bengalensis, Tiger Cat.—£5 (once).

F. lynx.—The European Lynx seems to command high prices: £20 apiece for kittens, and £25 to £35 each for older animals.

F. caracal, Caracal Lynx.—£7 10s. (once).

F. concolor.—Pumas are very frequently offered for sale, for from £5 upwards. As with Lions, those specimens bred in European menageries are of less value than imported animals. £15 to £18 apiece seems the general price for good Pumas, but exceptionally fine females go up to £20, and males up to £25.

F. onca.—Young Jaguars sell for £25 to £35 each. I have noted £45 asked for a female, and as much as £80 for a male Jaguar.

F. pardalis.—Ocelots appear very variable in value, anything from £1 10s. to £9.

F. canadensis, Canadian Lynx.—£25 for a pair (once): that is to say, only half the value of the European Lynx!

Cynælurus jubatus.—The Chita, or Cheetah, appears rarely to come into the market. I have only two specimens noted, an eight-months-old cub for which £25 was asked, and an eighteen-months old female for which £37 10s. was asked.

Family VIVERRIDÆ.

Ten years' notes of the prices of the commonly imported species of Civet Cats, Genets, Paradoxures or Musangs, Ichneumons or Mongeese, and Meercats show a monotonous consistency of value; averaging about £1 to £1 5s. per animal. Naturally the smaller and commoner species are the cheapest, ranging down to fifteen, twelve, or even ten shillings per head, while the larger and more showy species, such as *Viverra civetta*, may go up to £3 and £4.

Family HYÆNIDÆ.

Hyæna crocuta.—The Spotted Hyæna is apparently not very easily obtainable alive. I have only noted it once on a trade-list, when £30 was asked. I may mention that, while resident in Africa, I have from time to time been asked by correspondents to get Spotted Hyænas for them, but so far I have never been able to oblige them. The Giza Zoological Gardens, in Egypt, from 1891 to 1907, have only received four specimens, all four presented, and all four males; so there has been no opportunity of breeding this interesting species, as has been done at times in European Zoological Gardens.

H. striata.—The Striped Hyæna, on the other hand, is at times a drug on the market: prices vary from £3 to £10 per animal.

Family CANIDÆ.

The price of European Wolves varies from ten shillings to £4, but is usually about £2 per animal. White Wolves are

more valuable; I have noted £2 10s. for a cub and £5 for an adult. American Wolves appear to be worth rather more than European ones. Dog-Wolf hybrids I have seen quoted at £3 15s. each.

Most Jackals, whether Asiatic or African, fetch very small prices in Europe, from ten shillings to £1 a head. The Black-backed Jackal, *Canis mesomelas*, may however go up to £2.

There is such a considerable trade in the common European Fox that it almost more pertains to ordinary commerce than to the wild-beast business: I have noted cubs quoted at from four to eighteen shillings each, and adults up to £2 a head. Various species of American Foxes, including *Canis virginianus*, *C. azaræ*, and *C. cancrivorus*, appear to be imported to Europe, and sold at from fifteen shillings to £1 each.

The Arctic Fox, *Canis lagopus*, is quoted at from £2 10s. to £3 15s. a head.

The more aberrant Dogs seldom come into the market. The Raccoon-like Dog, *Canis procyonides*, I have once seen offered for £2 5s.; £30 was asked in 1907 for a male Asiatic Wild Dog, *Cuon alpinus*; and the Cape Hunting Dog, *Lycan pictus*, if in good condition, always commands a high price, from £20 to £25 for puppies up to £45 for an adult male.

Family MUSTELIDÆ.

Besides the Ferret, which does not come within the scope of this article, there is only one member of this family that is at all often offered for sale, that being the European Badger, *Meles taxus*, which seems to maintain a steady price of ten to fifteen shillings for young animals and fifteen shillings to £1 for adults.

Other prices for *Mustelidæ* that I have noted are:—
Mustela foina, Beech-Marten.—Five shillings.

M. putorius, Polecat.—Five shillings.

Gulo luscus, Glutton, or Wolverine.—£15.

Galictis barbara, Tayra.—£5.

G. vittata, Grison.—£1 5s. to £1 15s.

Ictonyx zorilla, Cape Striped-Polecat.—£1 10s. to £2.

Mellivora capensis, Ratel, or Honey-Badger.—£6.

Lutra vulgaris, European Otter.—£3 15s.

Family PROCYONIDÆ.

Raccoons, *Procyon*, and Coatis, *Nasua*, are regularly imported from America, and seem to command a steady sale in Europe both to public menageries and to private fanciers at from £1 to £2 a head.

The Kinkajou, *Potos flavus* (or *Cercoleptes caudivolvulus*) is, however, deservedly a greater favourite: I have seen it quoted at £3, but £5 is more like its value, and some individuals are certainly worth even more.

Family URSIDÆ.

For our present purposes Bears may be divided into Polar Bears and other Bears.

Of Polar Bears I have no personal experience; I have been offered (and declined) them at the following prices: £25, £35, £40, £42 10s., and £50.

The other Bears, usually imported to Europe, fetch very small prices. Unless the supply very much exceeds the demand, I cannot understand this: for they are as a rule hardy beasts in captivity, easy and *very cheap* to feed, and often great favourites both with their keepers and the public visitors. One factor that may perhaps keep down the dealer's prices is that many people, in India and elsewhere, obtain Bear-cubs as pets, and later, when the young Bear begins to get too masterful for a private household, the owners are only too willing to present their pet to some public Zoological Garden. Personally, in the last ten years I have had twelve Bears in my charge, and only one was purchased, and that only for £4!

Bears, of various species, appear to be very subject to blindness in captivity: blind Bears appear on dealers' price lists at £2 10s. and upwards: one would imagine that their skins and flesh were worth more.

The Brown Bear, *Ursus arctos*, is generally offered for sale at from £5 to £8 per animal, but I have noted £10 asked for a female and £11 for a male.

The Malay Bear, *U. malayanus*, is often offered for £5, but may go up to as much as £12 or £13.

The Sloth Bear, *Melursus ursinus*, is of rather greater value;

prices range from £5 to £15, and I have seen as much as £25 asked.

I regret that I have no data concerning the prices of any of the American Bears.

Family OTARIIDÆ.

The Californian Sea-Lion is sold for from £40 to £50 a head in Europe. The other species rarely come into the market.

Family PHOCIDÆ.

I have hardly been able to ascertain anything as to the values of Seals. The common European Seal, *Phoca vitulina*, I once saw on a price list quoted at £4: and a travelling showman was once very anxious to sell me a Mediterranean Seal, *Monachus albiventer*, for £100!!!

Order CHIROPTERA.

Family PTEROPODIDÆ.

The African Fruit-Bat, *Rousettus leachi* (*Cynonycteris collaris* of Slater's list) used to be sold by the Zoological Society of London for £1 5s. each: these were specimens bred in their menagerie.

Order RODENTIA.

Family SCIURIDÆ.

The prices of Squirrels present little of interest, ranging from the common Indian Palm-Squirrel at ten shillings a head to the great Malabar Squirrel at £2 to £2 5s.

The European Marmot I have noted priced at £1 5s., and the American "Prairie Dog" at £1 a head.

Family CASTORIDÆ.

The only Beavers I have ever seen offered for sale are the Canadian ones bred in the Hamburg Zoological Gardens, which are priced at from £15 to £17 10s. each. If such prices could be maintained, the breeding of Beavers in Europe should be a profitable business.

Family OCTODONTIDÆ.

Myopotamus coypus, the Coypu-Rat, frequently figures in price lists at from eighteen shillings to as much as £3 per head.

Family HYSTRICIDÆ.

Hystrix cristata.—The various races of Porcupines which it is convenient to group under this name vary in price, according to

the age and condition of the individual, from £3 to £12 10s. : but £4 to £5 is an ordinary price to give for a common Porcupine.

H. javanica.—£3 to £3 15s. seems a fair price for the smaller and crestless Asiatic Porcupines.

Erithizon dorsatus. — The Canadian Porcupine during the last two years appears to have been imported fairly freely into Europe, and prices range from £1 10s. to £3 15s.

Sphingurus villosus. — This Brazilian Porcupine I have only once seen mentioned in a price list, at £3.

Family CHINCHILLIDÆ.

Chinchilla lanigera, the Chinchilla.—£2 10s. (once).

Lagostomus trichodactylus, the Viscacha.—£2 (once).

Family DASYPROCTIDÆ.

The Paca, *Cælogenys*, though sometimes quoted lower, is worth from £3 to £5 apiece. The Agouti, *Dasyprocta aguti* and *D. azaræ*, is worth from £1 10s. to £2 each.

Family CAVIIDÆ.

The Mara, *Dolichotis patachonica*, I have seen quoted at from £5 to £7 10s. each, and the Capybara, *Hydrochærus*, at from £3 10s. to £15 each.

Family LEPORIDÆ.

The South German and Austrian dealers offer European Hares at from five to eighteen shillings each, according to sex, time of year, &c., and European Rabbits at from eighteenpence to two shillings each.

Order UNGULATA.

Suborder HYRACOIDEA.

Family PROCAVIIDÆ.

The only species of Hyrax that seems to find its way into the hands of European dealers is the South African *Procavia capensis* : I have seen it *quoted* at from £2 to £5 each, but it frequently seems to be "out of stock" when one, in answer to an advertisement, wishes to buy it; I have only once been successful enough to actually buy some, which was from a Hamburg dealer, at the price of £4 per Hyrax, which I consider very reasonable.

Suborder PROBOSCIDEA.

Family ELEPHANTIDÆ.

The subject of Elephants, in which I have personally been much interested for several years, is too large to go into within the limits of this article. Their values depend on several quite different factors from those of the ordinary menagerie animal, which is never supposed to leave its cage. I will only mention here that according to recent price lists young Asiatic Elephants are worth in Europe from £200 upwards, and young Africans from £350 upwards.

Suborder PERISSODACTYLA.

As stated in the preface this article, being limited to my own personal experiences, I very much regret being unable to give any information as to the values of Rhinoceroses or Tapirs, and only the following few prices for members of the *Equidæ* :—

Equus prjewalskii, Asiatic Wild Horse.—£100 to £130 each.

E. caballus var., Shetland Pony.—£10 to £12 10s.

„ „ Javanese Pony.—£20 to £27 10s.

E. asinus var., Sardinian Donkey.—£3 to £7 10s.

E. "æniopus", African Wild Donkey.—£5 to £7.

E. "hemionus", Asiatic Wild Donkey.—£22 10s., asked.

E. burchelli.—The various subspecies of Burchell's Zebra form the large majority of all the Zebras to be seen in Zoological Gardens: their price is usually fairly stable at £100 per head, but it varies from £80 or £90 to as much as £150, for specimens of the rarer varieties.

Suborder ARTIODACTYLA.

Family BOVIDÆ.

The variety of prices among this great family, which includes the Cattle, Antelopes, Goats and Sheep, is perhaps the most interesting to be met with amongst all the families of Mammals: and it must be remembered how far from complete this list, of necessity, is, some of the finest species (for instance the Greater Kudu) not being mentioned.

Cattle.

Bos indicus.—Various races of the domestic Indian Cattle, commonly called Zebus in Europe, are frequently offered for sale by Zoological Gardens and dealers, at every sort of price, according to age, size, sex and breed, from £2 10s. to £40 per head.

B. (Bison) bonasus.—I have only once seen a specimen of the European Bison offered for sale—it was a bull—for which £250 was asked.

B. (B.) americanus.—The American Bison figures on price lists fairly regularly, at from £50 to £100 per head. £37 10s., for a four months old bull calf, is the lowest price I have noted, and £150 for a five years old bull is the highest price I have seen asked.

B. (Pæphagus) grunniens.—As the Yak breeds freely in European menageries, it does not fetch a large price when sold: usually about £12 10s. to £15 a head, going up to £17 or £18 at most. Bulls and cows appear to be of equal value.

B. (Bibos) frontalis, Gayal. — £75 asked for an adult cow (once).

B. (B.) sondaicus, Banting. — £40 asked for a young male (once).

B. (Bubalis) buffelus.—For domestic Indian Water-Bufferaloes, generally bred in Europe, I have noted the following prices: £7 10s., £10, £15 and £17 10s.

B. (Anoa) depressicornis.—The Anoa I have only twice seen priced, once £15 (for a young female), and once £25.

Antelopes.

Bubalis (Damaliscus) albifrons, Bless-bok.—From £40 or £50 each, to at times perhaps as much as £75.

B. (D.) pygargus, Bonte-bok.—£100 for a bull (once).

Connochætes gnu, White-tailed Gnu. — £75 to £100 each: young animals sometimes cheaper, *i. e.* £60 apiece.

C. taurinus, Brindled Gnu, and its local races, such as the White-bearded Gnu.—£100 to £125 each.

Cephalophus monticola, Blue Duiker.—£5 (once).

C. grimmi, the Duiker.—£7 10s. to £12 10s. each.

Raphicerus melanotis, Grys-bok.—£12, asked (once).

R. tragulus, Stein-bok.—£10 and £12, asked (twice).

Cobus ellipsiprynnus, Southern Waterbuck.—£75 (once).

C. unctuosus, Western Waterbuck.—£35 to £60 each.

Cervicapra isabellina, Isabelline Reedbuck.—£8 to £12 each.

C. bohor, Bohor Reedbuck.—£15 (once).

C. redunca, Nagor Reedbuck.—£15 (twice).

Gazella dorcas, Dorcas Gazelle.—£4 15s. (once).

G. rufifrons, Korin Gazelle.—£7 10s. to £15 each.

G. bennetti, Indian Gazelle.—£5 and £6.

G. subgutturosa, Persian Gazelle.—£8 (twice).

G. sømmerringi, Soemmerring's Gazelle.—£15 to £20 each.

G. euchore, Spring-bok.—£15 to £20 each.

Saiga tatarica, Saiga Antelope.—£20 for young fawn (once).

Antilope cervicapra, Indian Blackbuck.—Males £4 to £10, females £8 to £13 15s., each.

Hippotragus niger, Sable Antelope.—£125 to £150 each: lately (1908) two yearling males have been offered for only £100 each.

H. equinus, Roan Antelope.—£130 to £150 each.

Oryx leucoryx, Sabre-horned Antelope.—£32 10s. each (twice).

O. beatrix, Princess Beatrice's Antelope.—£50 each, and upwards; the highest price I have noted asked is £120.

Addax naso-maculatus, Addax Antelope.—£80 (once): £100 asked per head.

Orias canna (or *Taurotragus oryx*), Eland Antelope.—£150 to £175 each.

Strepsiceros imberbis, Lesser Kudu.—£25 asked for a young female (once).

Tragelaphus sylvaticus, Bush-buck.—Male, £20 (once).

T. gratus, Congan Sitatunga, or Marsh-buck.—This Antelope has bred so freely in European Zoological Gardens during the last few years that its value seems to have gone down from £30 or £37 10s. to £10 or £15 per head.

Portax picta (or *Boselaphus tragocamelus*), Nilgai, or Nylghaie.—£12 to £20 each.

Goat-Antelopes.

Rupicapra tragus, Chamois.—£6 10s. to £9 each.

Goats.

Capra megaceros, Markhoor.—£40 to £100 asked for fine males.

C. (Hemitragus) jemlaica, Thar.—£10 to £25 each, according to age, &c.

C. (H.) hylocrius, Nilgiri Wild Goat.—£25 for a yearling male (once).

Sheep.

Ovis musimon, Muflon.—£5 to £12 10s. each.

O. vignei (or *O. cycloceros*), Punjaub Wild Sheep.—£10 to £25 each.

O. nahura (or *O. burrhel*), Bharal Wild Sheep.—£15 to £25 each.

O. lervia (or *O. tragelaphus*), Arui, or Barbary, Wild Sheep.—£3 to £16 each, according to age, sex, &c.

O. ammon, Argali Wild Sheep.—£100 per head, asked (once).

Family GIRAFFIDÆ.

Supply and demand affect the price of Giraffes quicker than in the case of smaller animals: before the reopening of the Egyptian Sudan in 1898–1899 there was a time when it was impossible to buy a Giraffe for £1000; then, about 1903–1904, when a few specimens had been brought down the Nile to Cairo and a much larger number exported from the Sudan *viâ* Suakin, the value of these animals went down to about £300 or £350 per head—in fact, to a price that did not pay the expenses of capturing them and sending them to Europe; so that certain traders (not real animal dealers), who had purchased Giraffes as a speculation, actually slaughtered their animals and realized what money they could by the sale of their skins and flesh rather than go to the expense of keeping the beasts alive till they could be sold at remunerative prices. I would remark here that there is a very great difference between the genuine dealer in wild animals, who is at heart a zoologist and a lover of beasts, and the merchant who simply, from time to time, trades in them as he would in cotton, tin, or guano, simply with the object of making money. The fair value of a healthy young Giraffe at the present time in Europe should be £400 to £500.

Family CERVIDÆ.

Compared to Antelopes, Deer are of but little value, as the following prices will show.

Cervulus muntjac, Muntjac, or Barking Deer. — Usually £10 each, male or female.

C. elaphus, Red Deer.—Although, when wishing to dispose of surplus stock, young Red Deer may be offered for as little as

£2 to £3 apiece, the regular Central European prices for good animals may be taken as follows :—

Males.—Calves . . .		£4 to £5.	£	£
Antlered 2 points, Spiesser,			7 to	8.
„ 4 „ Gabler,			8 „	9.
„ 6 „ Sechsender,			10 „	12.
„ 8 „ Achtender,			12 „	15.
„ 10 „ Zehnender,			16 „	17.
„ 12 „ Zwölfer,			20 „	23.
„ 14 „ Vierzehner,			25 „	28.

Females.—£4 to £7, according to age.

White Red Deer apparently fetch good prices for menagerie purposes. I have noted a white hind offered for £13 10s.

C. elaphus corsicanus.—I have once seen the “Sardinian” Red Deer quoted at £30 per pair.

C. elaphus maral.—Of the Eastern Red Deer I have only two notes—a male calf for £7 10s., and an adult male for £20.

C. canadensis.—The American Wapiti Deer, and its Asiatic allies, *asiaticus* (or *eustephanus*), *luethdorfi*, *xanthopygus*, &c., cause a certain amount of confusion, and some amusement, to the animal trade; experts differ as to which race is which, and owing to the various hybrids which have been bred in captivity, both among the different Wapitis and also crossed with Red Deer, it is doubtful if the matter will be ever entirely cleared up. Young animals appear to be worth £8 to £12 apiece, and adults £20 to £35. It is true that more than once a pair of these fine Deer have been advertized for sale for £100, but at any rate, in one case I know the vendors reduced this to £40!

C. mantchuricus, Manchurian Deer.—£15 each.

C. sika, Japanese Deer.—£3 15s. to £8 10s. each, though £12 10s. has been asked for a female.

C. duvaucelli, Barasingha Deer.—£30 to £40 asked for imported adult males.

C. unicolor (or *C. aristotelis* and *C. equinus*), Sambur.—£5 to £10 each. £15 asked for specially good animals.

C. porcinus, Hog Deer.—£3 to £6 each.

C. hippelaphus, Javan Deer.—£6 to £10 each.

C. moluccensis, Moluccan Deer.—£2 10s. to £8 15s. each.

C. axis, Axis, or Chital, Deer.—£6 to £10 each: but fawns may sometimes be purchased for £3 10s. apiece, and I have

noted as much as £12 10s. asked for a male, and £13 15s. for a female.

C. dama, Fallow Deer.—The range of prices I have noted for this species is £1 8s. to £7 10s. The ordinary values are :—

Males, £2 to £7 each, according to age.

Females, £2 to £5 ,, ,, ,,

White individuals, 20 per cent. more. Black individuals, 10 per cent. more.

Alces machlis.—I once noted a two-year-old male Elk offered for £40.

Capreolus caprea.—The Roe sells in Central Europe for from £2 to £3 per head: though fawns may sometimes be purchased in July for £1 5s. each; and for particularly fine adults as much as £3 10s. may be required.

Of the American Deer, *Cariacus virginianus*, *C. mexicanus*, *C. paludosus*, *C. gymnotis*, *C. campestris*, *C. rufus*, &c., I have unfortunately but little knowledge: prices vary from £2 5s. for young animals born in European Zoological Gardens up to as much as £25 for adults.

Rangifer tarandus.—The Reindeer I have seen thrice on price lists; young animals at from £3 15s. to £9 each.

Family TRAGULIDÆ.

The Mouse-Deer, or Chevrotains, of the more commonly imported species from India and Malaya, sell for about £2 each.

Family CAMELIDÆ.

Lama huanacos, Wild Lama, or Huanaco.—£5 to £20 each.

L. glama (or *peruana*), Domestic Lama.—£7 10s. to £22 10s. each: white individuals being the most valuable.

Camelus dromedarius, Arabian Camel.—£20 to £45 each: as with the Lama, apparently white animals are most favoured in Europe.

C. bactrianus, Bactrian Camel.—£17 10s. to £50 each: white animals again being of more value than brown.

Family HIPPOPOTAMIDÆ.

Hippopotamus, whether imported from Africa or bred in Zoological Gardens, command a very high price, £500 to £550 apiece, for even quite young animals.

Family SUIDÆ.

Phacochærus africanus.—I have only noted two quotations for Warthogs: £7 10s. for a four months old male, and £14 for a female.

Sus scrofa.—The following may be taken as ordinary prices for European Wild Swine:—Young (Frischlinge), £1 15s. to £2 10s. each. Young (Überläufer), £4 to £4 5s. each. Sows, £5 to £6 each. Boars, £5 10s. to £6 10s. each.

Babirusa alfurus.—The Babirusa, or Wild Pig of the Celebes, has recently been offered at £40 and £50 a head, but I am not aware whether or not any specimens changed hands at these prices.

Potamochoærus africanus.—The African Bush-Pig is not unfrequently offered for sale at prices varying from £7 10s. to £15 per head for young animals, but as much as £17 10s. and £20 have been asked.

P. penicillatus.—The Red River-Hog is a more expensive animal, being valued at from £25 to £40 per head.

Dicotyles tajaçu and *D. labiatus*.—The American Wild Pigs, or Peccaries, appear to be of very little value in Europe, compared to African or East Asiatic Pigs. The Collared Peccary has been quoted at from £1 15s. to £2 5s. per head, and the White-lipped Peccary at from £2 to £2 10s.

Order EDENTATA.

Family BRADYPODIDÆ.

The Sloth, *Cholæpus didactylus*, changes hands in Europe at from £17 to £20.

Family DASYPODIDÆ.

The Common Armadillo, *Dasypus villosus*, may sometimes be purchased in Europe for as little as £1 (only fifteen shillings has been asked!), but £2 to £3 is a more usual price. The only other Armadillo of which I have any personal experience is the long-tailed *Cabassus* (or *Xenurus*) *unicinctus*; a Hamburg dealer once sold me a fine pair of these animals for £10.

Family MYRMECOPHAGIDÆ.

Myrmecophaga jubata, Great Ant-eater.—£30, young; £40, adult.

Order MARSUPIALIA.

Family MACROPODIDÆ.

The following values for Kangaroos are taken from price lists. I have been told by an Australian correspondent that during the last few years the value of Kangaroos has very much increased, but so far I have not observed any indication of this in European sales:—

Macropus giganteus, Great Grey Kangaroo.—£12 10s. to £30 each.

M. giganteus melanops, Black-faced Kangaroo.—£20 each (twice).

M. antilopinus, Antilopine Kangaroo.—£40 each (twice).

M. robustus, Wallaroo.—£7 10s. to £15 each.

M. robustus cervinus, Cervine Kangaroo.—£20 to £35 each.

M. rufus, Red Kangaroo.—£10 to £25 each.

M. ualabatus, Black-tailed Wallaby.—£7 10s. each (once).

M. ruficollis bennetti, Bennett's Wallaby.—£5 to £8 15s. each.

M. dorsalis, Black-striped Wallaby.—£2 10s. to £5 each.

M. agilis, Agile Wallaby.—£5 to £7 10s. each.

M. eugenii, Dama Wallaby.—£10 asked for a female (once).

M. billardieri, Red-bellied Wallaby.—£5 to £9 each.

Petrogale penicillata, Brush-tailed Rock-Wallaby.—£4 to £7 10s. each.

Onychogale unguifera, Nail-tailed Wallaby.—£5 asked for a male (once).

O. frenata, Bridled Wallaby.—£3 to £10 each.

Bettongia gaimardi, Gaimard's Rat-Kangaroo.—£1 (once).

B. lesueuri, Lesueur's Rat-Kangaroo.—£2 (once).

Potorous tridactylus, Common Rat-Kangaroo.—£1 (once).

Family PHALANGERIDÆ.

The more commonly imported species of Australian Opossums, or Phalangers, of the genera *Trichosurus* and *Petaurus*, are generally worth from £1 to £1 10s. apiece in Europe. £3 15s. is the highest sum I have seen asked for one of these animals.

Family PHASCOLOMYIDÆ.

The Wombat.—£10 (twice).

Family PERAMELIDÆ.

Perameles obesula, Short-nosed Bandicoot.—£2 each (once).

Order MONOTREMATA.

Family ECHIDNIDÆ.

Echidna hystrix, *Echidna*.—£4 (once).

Class AVES.

Order PASSERES.

The vast majority of the species of Passerine birds that come into the market show little variety of price: usually from five shillings to £2 per bird: ranging down to one shilling, and up to £2 10s. Very showy birds, such as members of the families *Paradiseidæ* and *Cotingidæ*, of course command much higher prices: as do newly imported species of other families, if there happens to be any competition among amateurs to secure them.

Order PICARIÆ.

Of the very varied assortment of birds retained for convenience in this Order, there are but few species that can often be obtained from dealers. The delightful African Mouse-birds or Colies, *Colius*, cost about £2 each. The Australian Laughing Kingfishers, *Dacelo*, from £1 to £2. The African Ground-Hornbills, *Bucorvus*, from £5 to £10. The handsome Toco Toucan, *Rhamphastos toco*, £4 to £4 10s.; the smaller Toucans from £1 10s. to £3. The Touracous, *Turacus* and *Schizorhis*, £4 to £5.

Order PSITTACI.

Generally speaking, Parrots, as birds (and apart from any tricks of speech that they may have acquired), are worth from £1 to £3 each. Except: on the one hand certain species for which higher prices must always be given, as, for instance, the Ganga Cockatoo, *Callocephalon*, £3 10s. to £5, and the larger Macaws, *Ara* and *Anodorhynchus*, £3 to £12. As is well known, the Black Cockatoos are even more valuable; I have seen £45 asked for a pair of *Calyptorhynchus stellatus*. And it must be remembered that, as in the case of all other birds, newly, or very rarely, imported species of Parrots command high prices, according to the competition to possess them.

On the other hand, certain species of small Parrots, that come regularly into the market, can be bought for less than £1: as the Cockateel, *Calopsittacus novæ-hollandiæ*, which sells at from four to six shillings a bird; the horribly screeching Grey-

breasted, or Quaker, Parrakeet, *Myopsittacus monachus*, five to fifteen shillings; the common Green Parrakeets of the genus *Palæornis*, five to fifteen shillings; the Madagascar Love-birds, *Agapornis cana*, two to six shillings; and the Budgerigar, *Melopsittacus undulatus*, two to four shillings per normally coloured bird, and five to ten shillings per yellow bird.

Order STRIGES.

The only Owl that is at all frequently offered for sale is the Grand Duke, or European Eagle-Owl, *Bubo maximus*. Young birds may sometimes be obtained for £1 8s., but £2 10s. to £3 is the usual price.

Order ACCIPITRES.

The values of the Falcons and their allies for purposes of falconry hardly come within the scope of this article. For purely menagerie purposes the smaller birds of prey fetch low prices, rarely exceeding thirty shillings apiece.

The commoner Eagles and Old-World Vultures, such as *Geranoaëtus melanoleucus*, *Helotarsus ecaudatus*, *Haliaëtus albicilla*, *Aquila chrysaëtus*, *A. imperialis*, *A. nævioides*, *A. clanga*, *Vultur monachus*, *Gyps fulvus* and *Gypohierax angolensis*, are worth from £1 to £4 each. Rarer species, such as the Hawk Eagles, *Spizaëtus coronatus* and *S. bellicosus*, and the Sociable Vultur, *Vultur auricularis*, from £5 to perhaps £10 each. The Lämmergeier, *Gypaëtus barbatus*, is still more expensive, the prices of which I have notes ranging from £7 10s. to £25.

The Secretary Birds, *Serpentarius reptilivorus* and *S. gambiensis*, are, however, probably the most valuable birds of prey, but I have no data available.

Of the American Vultures, I have only the following notes:—*Cathartes atratus*, Black Vulture.—£1 10s. to £2 10s.

Sarcorhamphus gryphus, Condor.—£35 for an adult pair (once).

Gypagus papa, King Vulture.—Young birds £4 to £8, adults in full colour £15 each.

Order STEGANOPODES.

Pelecanus onocrotalus, the Pelican.—£2 10s. to £5 each.

P. rufescens, Red-backed Pelican.—£3 15s. to £5.

P. conspicillatus, Australian Pelican.—£12 10s. each (once).

Sula bassana, Gannet.—£2 (once).

Phalacrocorax carbo, the Cormorant.—Six to ten shillings each.

Order HERODIONES.

Of Herons, I have notes of prices varying from five shillings for *Ardea cinerea* to £5 for *A. goliath*.

Most of the Storks, Spoonbills and Ibises are presumably so attractive to purchasers that when specimens come into dealer's hands they can be at once disposed of, as I have only seen the following ten species advertised for sale: and on several occasions when wishing to purchase I have been unable to do so, though prepared, if necessary, to give a higher price than that advertised:—

Ciconia nigra, Black Stork.—£1 5s. (once).

C. alba, White Stork.—Six shillings to £1.

C. (Dissura) maguari, Maguari Stork.—£2 to £5.

Mycteria americana, American Jabiru.—£20 (once).

Leptoptilus crumeniferus.—The Marabou is from time to time offered for sale, at every sort of price from £2 to £15 per bird.

Platalea leucorodia, Spoonbill.—Ten shillings to £1 10s.

P. ajaja (or *Ajaja rosea*), Roseate Spoonbill.—£3 to £5 15s.

Ibis strictipennis, Australian Sacred Ibis.—£4 to £5 15s.

I. (Carphibis) spinicollis, Straw-necked Ibis.—£3 15s.

I. (Plegadis) falcinellus, Glossy Ibis.—£1 10s. (once).

Order ANSERES.

Suborder ODONTOGLOSSÆ.

Phœnicopterus roseus, Flamingo.—£2 to £3 5s. each.

Suborder PALAMEDEÆ.

Chauna cristata, Crested Screamer.—£3 10s. to £4 each.

Suborder ANSERES VERÆ.

Cygnus musicus, Whooper Swan.—£4 5s. to £6 5s. each.

C. bewicki, Bewick's Swan.—£7 10s. (once).

C. olor, Mute Swan.—£1 to £2 each.

C. nigricollis, Black-necked Swan.—Though young birds have been offered for as little as £2 apiece, £5 to £10 each are more usual prices.

C. atratus, Black Swan.—£2 to £4 each.

C. coscoroba, Coscoroba Swan.—The price of these little Swans varies very much in different years, from £2 to £6 per bird.

Anseranas semipalmata, Magpie Goose.—£2 to £5 each.

Plectropterus gambensis, Spur-winged Goose.—£2 to £4 each.

Æx sponsa, Carolina, or Summer-, Duck.—£1 15s. to £2 10s. a pair.

Æ. galericulata, Mandarin Duck.—£1 10s. to £2 10s. a pair.

Bernicla canadensis, Canada Goose.—£1 10s. to £3 a pair.

Chloephaga magellanica, Upland Goose.—£1 5s. to £4 each.

Chenalopex ægyptiacus, Egyptian Goose.—Six shillings to £1 each.

Tadorna cornuta, Burrow Sheld-drake.—Nine shillings to £1 each.

T. casarca, Ruddy Sheld-drake.—£1 10s. each.

T. variegata, Variegated Sheld-drake.—£4 to £5 each.

T. tadornoides, Australian Sheld-drake.—£5 each (once).

Anas boscas, Wild Duck.—Four shillings each.

A. superciliosa, Australian Wild Duck.—£1 to £1 5s. each.

A. pæcilorhyncha, Spot-billed Duck.—£1 to £3 each.

Chaulelasmus streperus, Gadwall.—Ten to fifteen shillings each.

Mareca penelope, Wigeon.—Four to ten shillings each.

Dafila acuta, Pintail.—Six to eight shillings each.

D. spinicauda, Chilian Pintail.—Fifteen shillings to £1 6s. each.

Querquedula circia, Garganey Teal.—Six to eight shillings each.

Q. formosa, Japanese Teal.—£3 each (twice).

Q. crecca, the Teal.—Four to eight shillings each.

Spatula clypeata, Shoveler.—Six to ten shillings each.

Metopiana peposaca, Rosy-billed Duck.—£1 to £2 each.

Fuligula cristata.—£1 each (once).

F. rufina.—£1 10s. each and upwards.

F. ferina.—Nine to ten shillings each.

Somateria mollissima, Eider Duck.—£3 15s. to £5 each.

Order COLUMBÆ.

The Pigeons and Doves show little variety in value; six shillings to £1 10s. includes all the prices per bird that I have noted for thirteen different species. The Christmas Island Fruit-Pigeon, *Carpophaga whartoni*, has been offered at £8 a pair, but I do not know for certain whether it sold at that price.

The giant Crowned Pigeons of the genus *Goura* are, as might be expected, on quite a different commercial footing to the other members of the *Columbæ*. *Goura coronata* in 1907 was offered for as little as £5 a pair, but usually during the last ten years they have been worth £8 to £10 a pair. As much as £60 has been asked lately for a pair of *G. victoriae*, but £30 a pair is a more ordinary price for these magnificent birds.

Order GALLINÆ.

Suborder ALECTOROPODES.

Family TETRAONIDÆ.

The following prices for Grouse have been supplied by three different firms in South Germany and Austria, who state that they can only supply these birds in the latter part of the year, between the months of August and December.

Tetrao tetrix, Black Grouse.—£1 15s. to £2 each.

T. urogallus, Capercaillie.—£2 10s. and upwards per bird.

T. bonasia, Hazel Hen.—£1 to £1 10s. each.

Lagopus scoticus, Red Grouse.—Eighteen shillings to £1 10s. each.

L. mutus, Ptarmigan.—£1 to £1 10s. each.

Family PHASIANIDÆ.

The aviculturist who wishes to buy live birds of this family can give practically any price he wishes, according to the species he selects, from one to two shillings for a Common Quail up to £20 or more for an Argus Pheasant.

European Partridges, *Perdix cinerea*, apparently cost two to six shillings each, and are cheapest from August to October. Hen Partridges are generally 25 per cent. dearer than cocks.

The Californian Quail, *Callipepla californica*, sell for six to ten shillings each.

Various species of Red-legged Partridges of the genus *Caccabis* are priced at from eight shillings to £1 each, and the more commonly imported species of the Indian Partridges of the genus *Francolinus* at from fifteen shillings to £1 10s. each.

On comparing the prices of Pheasants that have come to my notice in England, Germany and Austria during the last ten years, I find that the species fall into the following five groups.

These birds are so well known that it is sufficient to give the specific names only :—

1st. Under £2 a pair :—

colchicus, *torquatus*, *picta* and *nycthemerus*.

2nd. £2 to £4 a pair :—

versicolor, *satscheuensis*, *reevesi*, *amherstiae* and *melanonotus*.

3rd. Over £3 and up to £10 a pair :—

mantchuricum, *mongolicus*, *elliotti*, *wallichii*, *prælatius*, *swinhoii* and *caboti*.

4th. £10 to £20 a pair :—

impeyanus, *sæmmerringi*, *vieilloti*, *satyra* and *temmincki*.

5th. £20 to £25 a pair :—

nobilis.

Ordinary Peafowl, *Pavo cristatus*, cost fifteen shillings to £1 5s. each, White birds £2 10s. to £4, Black-winged £2 10s. to £5, and Javan *Pavo muticus* (or *spicifer*) £5 to £7 10s. per bird.

Though odd birds of the Peacock Pheasant, *Polyplectron chinquis*, may sometimes be obtained for as little as £1 10s., from £11 to £16 are asked for pairs.

Guinea-fowl vary from five shillings apiece for *Numida meleagris* to £6 a pair for *N. (Acryllium) vulturina*.

Suborder PERISTEROPODES.

The commoner species of Curassows and Penelopes appear to be worth from £3 to £6 12s. each, and the Brush-Turkeys, *Talegalla lathamii* £3 15s. to £6 5s. each.

Order FULICARIÆ.

Although the ordinary European Moorhen and Coot are only worth about six shillings apiece, the more showy species, such as the Giant Rails, *Aramides*, the Weka Rails, *Ocydromus*, and the Purple Coots, *Porphyrio*, sell for from £1 to £2 each.

Order ALECTORIDES.

The birds of this order include some of the greatest favourites both for public collections and for private fanciers, and practically all command high prices. I have, unfortunately, no notes of the values of Bustards, Trumpeters, and some of the rarer Cranes, nor of the Sun-Bittern, Kagu or Courlan.

Cariama cristata I have seen once priced at £3 15s., and once at £4.

Of the Cranes, the Demoiselle, *Grus virgo*, is by far the cheapest, and can sometimes be bought for £2 apiece.

The Grey Crane, *G. communis*, is the next cheapest at £5 each, then *leucogeranus* at from £6 to £8, and *australasiana* at from £8 to £10.

The Sarus, *antigone*, varies from £7 to £12 10s., the Stanley, *paradisea*, £10 to £17, and the Crowned Cranes, *Balearica*, from £12 10s. to £20 each.

Order IMPENNES.

The South African Jackass Penguin, *Spheniscus demersus*, appears to be the only species procurable in Europe. I have purchased them in Hamburg at £5 each.

Order CRYPTURI.

Tinamous, of various species, are frequently offered for sale at from fifteen shillings to £3 10s. per bird.

Order CASUARI.

Young individuals of the Ceram Cassowary, *Casuarius galeatus*, may sometimes be obtained for from £8 to £10 each; adult birds cost from £12 to £22. The other species of Cassowaries are all more expensive; *bicarunculatus* and *uniappendiculatus* are priced at from £20 to £40.

Young Emus, *Dromæus novæ-hollandiæ*, cost from £5 upwards, and adults £16 to £27 per pair.

Order STRUTHIONES.

The ordinary grey *Rhea americana* is worth from £6 to £12 10s. per bird, but white specimens from £12 10s. to £25 each.

The value of Ostriches is too big a subject to enter into in this article.

Class REPTILIA.

Practically all Reptiles that come into the market can be bought for from one shilling (in the case of the commonest European species) up to £3 apiece.

It is such large specimens as are in demand for public exhibition that cost more, and these very rapidly mount in price in proportion to their size: as the following examples show:—

Giant Tortoise of Aldabra, *Testudo elephantina*:

Length, 1·08 metres (or 3 ft. 6½ in.). Weight, 80 kilos (or 176 lb.). Price, £37.

Length, 1·28 metres (or 4 ft. 2 in.). Weight, 112 kilos (or 246 lb.). Price, £50.

Length, 1·32 metres (or 4 ft. 4 in.). Weight, 145 kilos (or 319 lb.). Price, £90.

Length, 1·33 metres (or 4 ft. 4 in.). Weight, 166 kilos (or 365 lb.). Price, £100.

Crocodiles, Alligators, and Caimans, at about 3 ft. 3 in. (or 1·00 metre) in length, pass the £3 value, and if they are healthy and likely to do well in captivity they double their price much sooner than their length. As a matter of fact, specimens exceeding six or seven feet in length seem generally to be unprocurable at any price.

An American firm has sent me various quotations for *Alligator mississippiensis* delivered at New York, which may be summarized as from four shillings to £140, according to size.

Eight foot Alligators they offer at £9 to £12.

Ten ,, ,, ,, £18.

Eleven ,, ,, ,, £30.

Twelve ,, ,, ,, £45.

Thus the first twelve inches of an Alligator's life are only worth four shillings, but if he goes on growing the time comes when each extra twelve inches are worth £15 and upwards.

The large Lizards, like the Crocodiles, pass the £3 limit when about three feet in length. A Rhinoceros Iguana, *Metopoceros cornutus*, of 3 ft. 3 in. is worth about £5, and a *Varanus salvator* of 5 ft. 9 in. as much as £10.

The Pythons and Boas pass the £3 limit when about seven feet in length.

From 7 to 10 ft. long they are worth £3 to £5.

,, 12 to 13 ,, ,, ,, £8 15s. to £17 10s.

,, 14 to 15 ,, ,, ,, £20 to £35.

After fifteen feet they increase in value at about £5 per foot. For a 24-foot Snake £100 has been asked.

MONTAGU'S HARRIER IN SURREY.

BY COLLINGWOOD INGRAM.

MUCH interest was evinced last year when a pair of Montagu's Harriers (*Circus cineraceus*) were found nesting in Surrey, "within fifty miles of the Metropolis." These birds were first described as Hen-Harriers (*C. cyaneus*) ('British Birds,' January, 1908), but were finally and satisfactorily identified as belonging to the former species (*op. cit.*, April, 1908; also 'Field,' December, 1907). It transpires that this pair succeeded in rearing two young, but one of these was subsequently shot by a keeper. As this man was afterwards prosecuted, and a certain amount of publicity was given to the event, it is only fair to his employer to state that he had no authority for killing the bird; indeed, his master is such a keen ornithologist and a lover of nature that I am sure he regrets the incident as much as anyone.

With regard to the status of the various species of Harriers in Surrey, that gentleman has very kindly supplied me with the following facts, all of which are of the utmost value, considering the number of years he has made observations in the district:—"I have not actually located a Harrier's nest here till last year, but feel sure some birds were hatched off in 1906, as there were five about before the nesting-time in 1907. There have been three about here all last winter, but these were probably Hen-Harriers, as, according to authorities, Montagu's Harrier does not stay with us in winter. There has been no year for twenty-two years that I have not seen Harriers about our commons; I cannot say whether they were Hen-Harriers or Montagu's, as I never shot one, and they are difficult to distinguish on the wing. It is quite possible these birds never reared their young here, as, until recently, no one dreamt of protecting them, and the cruel and deadly pole-trap (now happily made illegal) accounted, *I know*, for several every year. I have never allowed pole-traps on my shooting, but about fifteen years ago I found a Hen-

Harrier in a pole-trap just over my boundary with one leg shattered. This I spliced with a quill-toothpick and a thin strip of my pocket-handkerchief, holding the bird between my knees and keeping the rest of the handkerchief over its head. The bird flew away gaily, and I threw the trap to the bottom of a pond. The birds shot by my keeper last year were an adult female Hen-Harrier in April and a young Montagu in August. I heard of a third bird being killed in the neighbourhood, but do not know whether it was young or old, or of which kind, as the keeper promptly buried it or sold it, and did not know himself what it was. It



NEST AND EGGS OF MONTAGU'S HARRIER.

was after the decease of this third bird that there were three constantly about, which either I or my keeper could easily have killed."

In another letter he says :—" The Marsh-Harrier is scarce, and I only saw one about here this year, but I can see Hen- or Montagu's Harriers any day."

All this seems to show that Harriers would undoubtedly re-establish themselves in England if they were left unmolested. During the second week of June this summer another nest of

Montagu's Harrier was found in Surrey—now one of the most densely populated counties in the United Kingdom—and was seen by me on the 13th and 14th of that month. As the site of this nest was very similar and quite close to that chosen last year there is no need for me to write a full description of it. Every effort was made to protect this pair, and a "watcher" was put on duty by the Royal Society for the Protection of Birds. Unfortunately, although everything seemed to be progressing favourably, for some reason the eggs did not hatch. On July 11th the female commenced to show signs of abandoning incubation, and she remained away from the nest most of that day. She was also absent throughout the following day, but was seen flying about in the vicinity of the nest. Previous to this the male had not been observed for some time.

It has been suggested that the eggs failed on account of the heat and the want of rain for twenty days. This theory is hardly tenable when it is realized that Montagu's Harrier is a more or less southern species, and breeds freely in Spain, while it also nests in North-west Africa, all of which countries are, of course, hotter and drier than any part of England.

Notes by Inspector Burroughs.—From June 13th to July 12th the nest was carefully watched by Inspector Burroughs, and very interesting observations were made. The following is a digest of his notes :—

It appears that the duty of incubation fell entirely to the female. She did not seem to have any recognized feeding-time, but was seen to leave the nest at various hours during the day—it was once as late as four in the afternoon before she was observed to rise. If frightened or disturbed in any way she would fly off hurriedly, sometimes uttering a cry that sounded like "chee-chee-chee." On these occasions she would go right away, remaining absent for half an hour or so before returning, which she usually did very warily. Approaching within twenty or thirty yards of the nest she would alight on the ground and run the remainder of the distance through the heather. When, however, she left of her own accord her behaviour was quite different; she would then rise gracefully, and, after circling over the ground for a short time, finally make away across the neighbouring hills. Sometimes a "chirping" cry would be emitted.

The bird usually returned in about thirty or forty minutes, and if no danger was apparent would drop straight down to the nest. Occasionally she would bring back a twig or something similar in her bill, which was added to the nest, and by the end of the third week the structure was noticed to be considerably deeper and larger in size.

The male generally put in an appearance about midday, when he would fly overhead and call to the female by means of a single note, which he repeated at intervals of about half a minute, until she left the nest and joined him. Sometimes he brought her food, which she took from him in mid-air. By its small size this probably consisted entirely of mice, and was certainly not chicken, pheasant, partridge, or rabbit, unless indeed these were brought in very small pieces. The two birds would frequently go away together.

In the evening, about seven o'clock, the male occasionally paid a second visit to the nest, but at these times he never remained long. Early in July his visits became much more frequent, but on the 7th he disappeared for several days. About this time the female grew very restless, and was repeatedly on and off the nest. On the 11th she left her eggs at nine a.m., and, after flying round for a short while, was not seen again until eight p.m., by which time, of course, the eggs were stone-cold. Both birds were observed in the vicinity of the nest at eight next morning, but soon after this they disappeared and were not seen again.

NOTES AND QUERIES.

A V E S.

Irregular Appearance of Blackbird.—For the last three years a Blackbird (*Turdus merula*) with a white head has visited my garden at curiously regular intervals. From careful observations I am convinced he is the same individual. He always turns up about the middle of July; this year he appeared on the 19th. He only stays a few days, and then disappears till October, when he repeats the visit and remains till the beginning of November. After that I see no more of him till the following July. I never see or hear of him anywhere else in this neighbourhood. I read in the papers recently that a similar bird had been seen in Merionethshire, and possibly it may be the same, as judging from the time between his visits he must make a wide circuit. I have always considered Blackbirds to be rather domestic in their habits, but this particular member of the tribe is evidently a confirmed Rambler. — R. H. RAMSBOTHAM (Elmhurst, Garstang).

An Early Flock of Starlings.—On June 21st, while rambling in Richmond Park, I saw a flock of about one hundred Starlings (*Sturnus vulgaris*) near the Roehampton gate. Is not this an early date for them to congregate? I have looked up Sharpe and Newton, but do not see any mention of earlier date than autumn, and was not aware of them doing so myself. — FRANK A. ARNOLD (139, Hamilton Road, West Norwood).

Hoopoe in Northamptonshire.—A Hoopoe was shot in South Northamptonshire, not many miles from Brackley, in the first week of May, 1908.—O. V. APLIN (Bloxham, Oxon).

Pallas's Sand-Grouse in Yorkshire.—During the first week of June three Sand-Grouse (*Syrrhaptes paradoxus*) were observed in a field of young corn in the eastern portion of Cleveland. Shortly afterwards one of them was picked up dead, and I have had an opportunity of examining this specimen, finding it to be a male in excellent plumage. The other two birds were seen at intervals until the middle of June, when they both disappeared.—T. H. NELSON (Seafeld, Redcar).

Ornithological Notes.—I am sending a few notes which may be of interest to readers of 'The Zoologist.' On Jan. 6th last I saw a Goosander (male) fly over Vauxhall Bridge at about four p.m. I was watching some Gulls, when, looking up, I suddenly saw this bird flying just over me up the river, and not more than about thirty or forty feet above the bridge, so that I could see the peculiar bill and the colouring perfectly. As it was flying so low, I think it must have risen close by, and evidently dropped again the other side, and perhaps dived, as on crossing the bridge I could not see it anywhere. I suppose this is a rare bird in the Metropolis, but the day in question was one with a strong south-west wind, immediately succeeding the bitter cold at the New Year, which might perhaps account for its appearance. I see in 'The Zoologist' there have been several records lately cited of the Chiffchaff singing like a Willow-Wren, or *vice versâ*. On April 5th, 1907, I was watching and listening to a Chiffchaff singing its usual song within a few feet of me, in a small copse near St. Leonards-on-Sea, when I was astonished to hear from (as I then felt sure) the same bird a feeble but unmistakable Willow-Wren's song. There were two or three birds about, but they were all Chiffchaffs, and I did not hear the Willow-Wren at all in this particular spot till some five days later. The bird was singing its usual note close to me both before and after, but I only heard the Willow-Wren song once; it was very feebly uttered, and I believe began with the usual "chiff-chaff" repeated once or twice. (I do not know whether a further instance of this will be of interest, but am mentioning it in case it is.) *Re* this subject, is not the Chiffchaff's note *almost* (if not) the same as the first note or two of the Willow-Wren's song?—H. G. ATTLEE (153, Beechcroft Road, Upper Tooting, S.W.).

Notes on Nest-Boxes.—We have had the Great Tit, Blue Tit, Creeper, Nuthatch, Tree-Sparrow, House-Sparrow, Starling, and Tawny Owl in our nest-boxes this season, but the Stock-Dove has not come to us this year. Three Robins' nests have been built in old kettles, though the birds have not been very successful in rearing their broods; one nice lot were stolen when about half-fledged, probably by a rat. One of the Great Tit's nests might fairly be described as "a fine specimen of the red variety," being made almost entirely of material collected from an old rug or carpet. This was spoiled by the mice which use the boxes in winter, and sometimes nearly fill them with acorns; these marauders had made such a hopeless mess of the nest with fragments of eggs and their contents that it was useless for a museum specimen. Two pair of Nuthatches hatched off in

boxes, the nests in both cases being made entirely of the bark of the Scotch fir, in which the eggs were buried. Of Tree-Sparrows we had seven or eight nests, and House-Sparrows, not content with occupying three or four boxes intended for more respectable tenants, spoiled our only House-Martin's nest. That the Starlings here only rear one brood in a season is pretty certain, as so many breed in our boxes that we have ample means of observing their ways. A Tawny Owl laid three eggs in an old cask and hatched them all; two young birds got safely away, and the third disappeared—how, I know not, as it was too small to have got out, and a human robber would have cleared off the whole brood. Another pair nested in the church-tower again, and hatched two out of three eggs; this pair of owlets also got away safely after one had got out of the nest and been replaced, while the third egg, which contained a dead young bird nearly hatched, now represents the species in the type-collection of eggs in the Ipswich Museum. Mr. Oliver Pike was staying with us while the hen was sitting, and successfully “shot” her as she flew from her nest with a cinematograph camera; we afterwards went up the tower, where he got a fine picture of the nest and eggs by magnesium light. Before we finished operations the old bird came back, but just too late to get a photograph of her. On one occasion I found no fewer than five rats around the nest, none of which could have been dead for more than a day. No bird-music gives me more genuine pleasure than that of the Tawny Owl, whether it be the squealing of the owlets in the dense foliage of midsummer or the far-reaching shout of the old birds on a frosty winter night. Unfortunately, as I am one of the most unmusical of mortals, the pleasure of comparing the notes of our Owls is denied to me. A reference to Gilbert White's tenth letter to his correspondent Barrington, in which he describes the records of a neighbour “said to have a nice ear,” will show that in the notes of Owls and Cuckoos there is an interesting, if not a new, sphere of observation for musical naturalists.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds, Suffolk).

Erratum.—‘Zoologist,’ 1908, page 131, line 27, for “Southwold” read “Sudbourne.”—J. H. GURNEY (Keswick Hall, Norwich).

EDITORIAL GLEANINGS.

"PARASITOLOGY," a Supplement to the 'Journal of Hygiene,' has recently appeared (vol. i. no. 1), and is published at Cambridge, at the University Press.

When the 'Journal of Hygiene' was founded it was announced that papers on Parasitology "in relation to hygiene and preventive medicine" would be published in its pages. It has, however, been felt for some time that the Journal was becoming unduly burdened with papers dealing with the anatomy of mosquitoes, fleas, protozoa and other parasites—of great importance in themselves—but having only an indirect relation to hygiene and preventive medicine.

The remarkable development of parasitology in recent years, and the increase in our knowledge of the part played by parasites in human and animal diseases, demand a means of publication, in the English language, of original papers dealing with the subject in its widest sense. It is proposed in future to relegate all such papers to "Parasitology."

The fundamental discoveries upon the modes of infection in plague, malaria, sleeping sickness, yellow fever, ankylostomiasis, elephantiasis, and other important diseases affecting man and animals, render it evident that the co-operation of specialists in different fields is required for the proper elucidation of the complex problems which surround the causation of these diseases. The successful study of such diseases as are carried through the agency of invertebrate hosts demands, therefore, not only investigations into the processes which occur in the affected vertebrate, but also observations on the structure and life-history of the pathogenic organism, and of the alternative host or hosts which serve to spread the disease. Thus a knowledge of the structure and biology of mosquitoes, biting flies, and ticks is necessary for a comprehensive knowledge of the etiology of malaria, trypanosomiasis, spirochætosis, and piroplasmosis, and a knowledge of fleas and their habits is essential in the study of plague. Further, recent discoveries relating to parasitic worms, especially those which produce filariasis, ankylostomiasis, and various intestinal diseases, have given a great stimulus to the study of the entozoa.

The first part is devoted to an elaborate and fully illustrated "Revision of the non-Combed Eyed Siphonaptera," by Dr. Karl Jordan and the Hon. N. C. Rothschild.

IN the Report of the Board of Scientific Advice to the Government of India, 1907, Dr. Annandale has contributed some interesting facts as to the progress of Indian zoology during that year. One of the most important features is the Survey of the Invertebrate Fauna of Stagnant Water. Additional collections of microscopic freshwater animals have been made in Calcutta, Eastern Bengal, the United Provinces, and the Simla Hill States by the Superintendent and the Museum Collector, and have been sent for determination to Prof. von Daday, of Buda Pesth, while a large number of specimens of aquatic and semi-aquatic insects have been obtained from the same districts. The aquatic Hemiptera have been sent to Mr. W. L. Distant for description in a supplement to his volumes on the Order in the 'Fauna of British India,' the *Chironomidae* (Midges) to the Abbé Keiffer in Germany, and the Neuroptera to Prof. Needham in the United States, while arrangements are being made regarding the working out of the aquatic beetles in France. The *Anophelinae* among the mosquitoes have been identified in the Museum, while the *Culicinae* will be identified in England by Mr. Theobald.

The work has not, however, been confined to the collection of specimens and their transmission abroad for identification, for investigations have been made into various obscure points in the structure and biology of the freshwater sponges (of which several new species have also been described), such as the process of budding, the nature of the inhalent pores, commensalism, and the production of gemmules.

Even more important than the fauna of freshwater ponds is that of the brackish pools in the Ganges delta, especially in the neighbourhood of Port Canning. Large collections have been made in such ponds, and it is hoped shortly, with the aid of the Rev. T. R. R. Stebbing, Dr. J. G. de Man, Mr. E. A. Smith, Mr. W. L. Distant, Col. Godwin Austen, M. Régimbart, and Prof. von Daday, to publish a complete fauna. It has been possible, thanks to the work done nearly forty years ago by the late Dr. F. Stoliczka, of the Geological Survey of India, to trace a very rapid and extraordinary change in the structure and habits of a sea-anemone (*Metridium schillerianum*) which occurs in certain brackish ponds of recent origin at Port Canning, while the other elements in the fauna to which this remarkable species belongs have proved of great biological interest.

WE have received the Report on the Sarawak Museum for 1907, written by the Curator, Mr. John Hewitt. Many difficulties have to be surmounted in a Bornean Museum. Thus we read of the collections :—"On the whole these are in very good condition. The show-cases of Mammals and Birds are now in the lower rooms, and the Ethnographical collection occupies almost the whole of the upper floor. From time to time, as opportunity arises, such birds or mammals as have faded are replaced by fresh specimens, and in the Ethnographical collection the cement-dusted sun-hats give place to new ones. The problem of insect attacks on soft wood has been solved, I hope, by washing with jodolite all specimens which are liable to attack. The stand for one bird-case has had to be replaced, as the wood of which the old one was made has been eaten. This wood was young nireh. During the year collections have been made at Matang, Santubong, Quop, Bidi, and on the Baram River, the latter still a fine region for botanists or entomologists."

We understand that Mr. Hewitt is relinquishing his post as Curator, and that he will be succeeded by Mr. Guy Marshall, the well-known naturalist of Matabeleland and Mashonaland. To supplement experiences and observations in Africa by a sojourn in Borneo may result in Mr. Marshall doing still greater things.

THE Report of the Trustees of the Australian Museum, Sydney, for 1907, has been issued. The following extract refers to a very excellent work connected with this Museum :—"The gallery lectures and demonstrations for teachers and students have been continued. There is not at present accommodation to make these available for the general public, and they are therefore prepared only for teachers and students. Tickets for public school teachers are distributed through the Department of Public Instruction. Private school teachers and students receive tickets from the Secretary of the Museum on application. The course consisted of :—Parasites and Messmates, by Mr. T. Whitelegge ; attendance, 7. The Birds of the County of Cumberland, part 1, by Mr. A. J. North ; attendance, 19. The Great Barrier Reef, by Mr. C. Hedley ; attendance, 34. The Sacred Beetle or Scarab, by Mr. W. J. Rainbow ; attendance, 12. Crystals, by Mr. C. Anderson ; attendance, 4. Australian Stone Implements and Objects, by Mr. W. W. Thorpe ; attendance, 8. Australian Mammals, by Mr. A. R. McCulloch ; attendance, 8. The Birds of the County of Cumberland, part 2, by Mr. A. J. North ; attendance, 17. The Depths of the Sea, by Mr. C. Hedley ; attendance, 85. Pelagic Life,

by Mr. C. Hedley ; attendance, 64. A Botanico-Entomological Study, by Mr. W. J. Rainbow ; attendance, 26."

THE Fourth International Fishery Congress will convene in the city of Washington, United States of America, from the 22nd to the 26th of September, 1908, to deliberate on important matters relating to fishing and fish culture, and to submit propositions for the benefit of the fisheries to Governments and to State, provincial, and local authorities. The Congress will be organized and conducted in conformity with the decisions for the regulation of the international fishery congresses decreed in Paris in 1900. The membership of the Congress will consist of Government, State, and provincial representatives, delegates from home and foreign societies, corporations and persons invited by the management of the Congress, and persons at home and abroad who are deemed to have an interest in the purposes of the Congress, and express a wish to take part in it. All members have a right to vote, to participate in the discussions, and to make independent propositions. In case a corporation should be represented by several delegates, the members of this delegation have the right only to one vote, which shall be cast by the delegate designated to the presiding officer. The delivery of the card of admission gives to members the right to take part in all the enterprises and excursions projected by the Congress, to receive all the publications, and to wear the insignia of the Congress. The members of the Congress are required to conform to its regulations and decisions. The membership fee is fixed at two dollars for each person, excepting the official representatives of Governments, who become members by virtue of their credentials.

In response to invitations extended by the Government of the United States, twelve national Governments have already signified their purpose to be officially represented, and delegates have been appointed by the governors of many of the states of the United States. In view of the small number of the nations which have formally indicated their inability to officially participate, and the large number of persons who will attend as individuals or as representatives of important fishery societies, the Congress promises to be important in its representative character, size, and the value of its proceedings.

All persons interested in the fisheries, fish culture, and fishery administration, or in scientific investigations and experiments related to the fisheries, are invited to attend the meetings and take part in

the discussions. To those who cannot attend the meetings of the Congress an invitation is extended to submit papers on subjects relating to the fisheries, mailing them to the Secretary-General of the Congress in season to reach him prior to the opening meeting. For the guidance of those desiring to participate in this manner, a scheme of subjects is submitted, but the papers need not be restricted to the titles suggested.

During the week beginning September 20th the headquarters of the Congress will be established in the New Willard Hotel, Washington, D. C., where information relating to hotel accommodation, transportation, places of interest, and other matters will be available. All communications and inquiries before that date should be addressed to the Secretary-General of the Congress, Bureau of Fisheries, Washington, D. C.

SOME days ago a curious sight was witnessed by the river-watcher and another gentleman on the banks of the River Helmsdale, in Sutherland. A Salmon, estimated to weigh between 20 lb. and 30 lb., was seen floating on its back and struggling in the water. On closer inspection it was seen that a large Eel had entwined itself about the Salmon's tail, and was holding it in a vice grip. With the Eel round its tail, the Salmon was helpless in the water, as its only means of propulsion was rendered useless. Such fights, it is said, are by no means uncommon, and the Eel generally comes off victorious.—*Shooting Times and British Sportsman*, Aug. 1st, 1908.

Caddis Larvæ and Water-lilies.—"On an evening in the end of June of this year I noticed a Water-Rat busily engaged diving in our garden pond and bringing to the surface what I then thought was a piece of decayed wood, about an inch in length. The Rat nibbled the "wood" with apparent enjoyment. For fully twenty minutes I watched the little creature's ceaseless industry. This year the water-lilies are sickly plants, and, to ascertain the reason why, the pond was emptied, when to our astonishment every root of every plant was riddled like a honeycomb, and the beds out of which they grew littered with the Rats' succulent morsels of "decayed wood," which, on examination, we discovered to be the larvæ of the caddis-fly. How to destroy this pest and save the water-lilies was a vexed question. However, on revisiting the pond late in the evening, the mud bottom and water-plants were almost hid from view with birds, all too busy

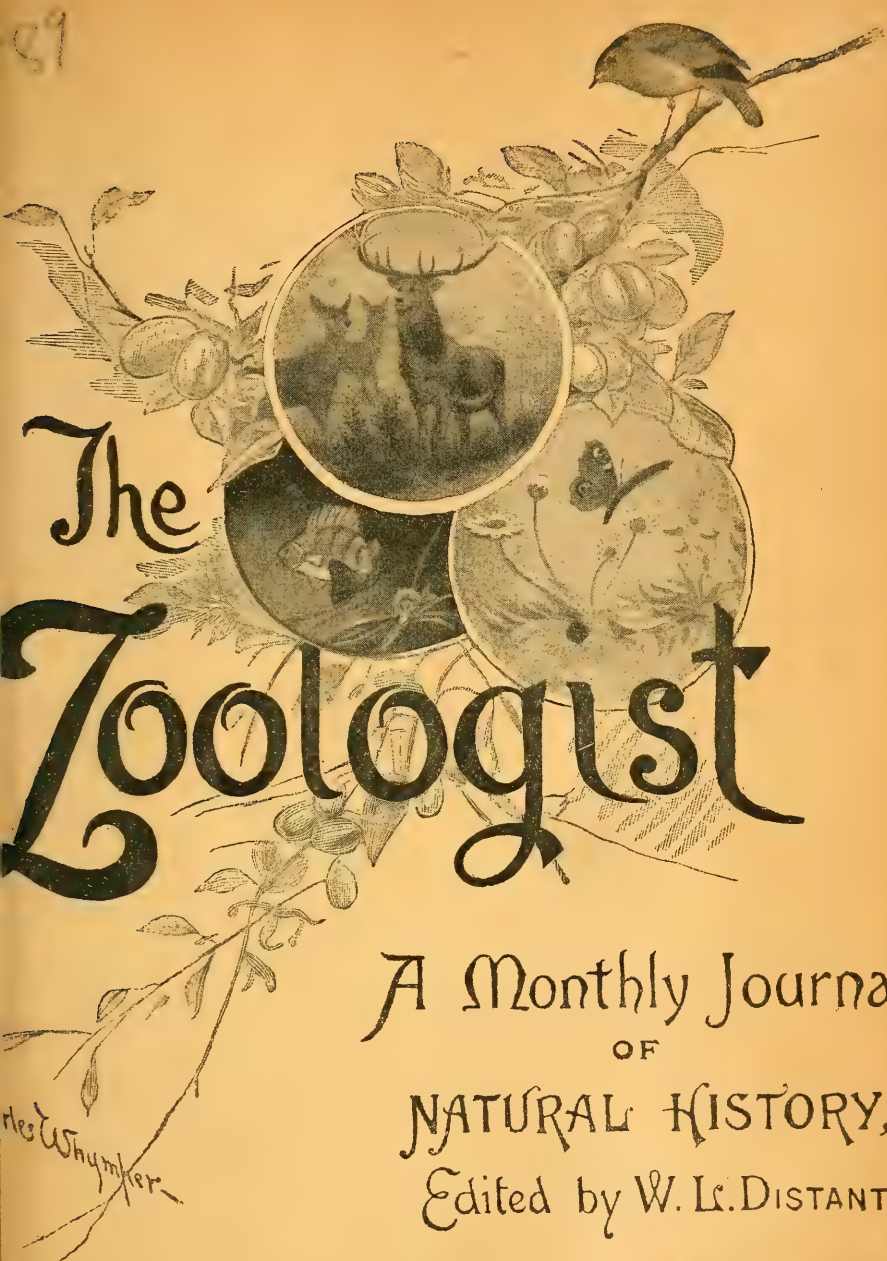
to be scared away. They were feasting riotously on the caddis. The pond was left dry for a week, and the larvæ of the caddis-fly has disappeared like magic. Sparrows deserve the greatest share of credit for clearing this pest away; their success in opening the hard case which encloses the larva was amazing. Picking it up in their bills they struck the case time after time on the slate-lined sides of the pond until it was broken and they could swallow the grub. As this is the first year the larvæ of the caddis-fly have been so abundant in the pond as to injure the water-plants, are we to attribute the cause to the absence of the Trout, which were formerly in the pond?"—"L. H. S.," in *Scotsman*.

OBITUARY.

PROFESSOR ALFRED GIARD.

"THE death is announced of one of the most eminent of French zoologists, M. Alfred Giard, professor at the Sorbonne, and member of the Académie des Sciences. He was born on August 8th, 1846, and died on the anniversary of his birth. He was educated at the École Normale Supérieure, and was Professor of Natural History at the Institut Industriel of Northern France, 1873, and of Zoology at Lille, 1880; and Maître de Conférences at the École Normale, 1887; whilst the Chair of 'Évolution des Êtres organisés' was created for him by the City of Paris. In 1896 he was elected President of the Entomological Society of France, and in 1900 was elected to the Académie des Sciences. He published several learned works, and contributed many papers to the 'Bulletin Scientifique du Nord,' of which he was the editor."

(We have taken this concise and accurate notice from the pages of the 'Athenæum,' August 15th, 1908.)



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THE ZOOLOGIST

No. 807.—*September, 1908.*

VERTEBRATES OF WALES AND IRELAND.

BY H. E. FORREST.

IN 'The Zoologist,' 1903, I published a paper contrasting the avifauna of North-west Wales with that of the opposite counties of Ireland. From the details therein given it was seen that a considerable number of species which are common in Wales are absent or very rare in Ireland. In some few instances the converse of this was noted.

In the present paper I propose to deal in a similar way with the other Vertebrates—Mammals, Reptiles, Amphibians, and Freshwater Fishes.*

To take these groups collectively has this advantage—that it emphasizes the difference in the factors which govern the geographical distribution of Birds and of the other Vertebrates. Whilst the former can pass through the air in any direction, the latter can travel only by land or along rivers.

Geologists tell us that the British Isles were formerly connected with the neighbouring parts of Europe by land. Subsequently subsidence took place, the lowest-lying parts becoming submerged first. The sea between England and the Netherlands is shallow, as also is the sea between England and the Isle of Man, but to the west of this is a deep channel (over fifty fathoms) which is continuous along the whole length of Ireland.

* Marine species are omitted, as they are common to the seas of both countries.

When the subsidence of the land began, this deep channel would be the earliest portion to sink beneath the waves, so that Ireland would become an island whilst Great Britain was still a part of the mainland. A further subsidence submerged more low-lying land, and converted Great Britain also into an island.

The land animals of these islands would naturally be identical with those of Western Europe so long as they were actually united with the mass of the continent, but the species have changed somewhat from time to time. For instance, the Lemming was at one time common over the whole of Western Europe, including the British Isles, but has since vanished from the greater portion of its ancient habitat.

It is evident that any changes in the species of land animals would affect these islands so long as they were connected with the Continent, but not afterwards. As Ireland was separated from the mainland before Great Britain, any species which reached the latter at a later period would be unable to reach the former on account of the sea intervening, whilst the occurrence of a species in Great Britain but not in Ireland would be presumptive evidence that it reached here whilst the latter was still connected by land with the Continent, but after Ireland had become an island. It also follows that species found in both countries are longer established, or "of older family," than those found only in Great Britain.

These considerations add largely to the interest and importance of the facts to be now adduced.*

FISHES.

POPE or RUFF.—Occurs in the Severn and tributaries, the Dee, and canals in the border counties of Wales. Unknown in Ireland.

ROACH.—Common in the eastern counties of Wales, rarer in the west. Unknown in Ireland.

RUDD.—Occurs in a few scattered localities in Wales. Abundant in Ireland, where it takes the place of the Roach.

DACE.—Common in the Severn and Dee with their tributaries. Unknown in Ireland.

* Full local details are given in the writer's 'Fauna of North Wales.'

MINNOW.—Common throughout Wales. Occurs in Ireland, but is said not to be indigenous; introduced a century ago.

BLEAK.—Found in rivers in the border counties of Wales. Unknown in Ireland.

TENCH.—Fairly common in the eastern counties of Wales. Occurs in Ireland, but is believed not to be indigenous.

GRAYLING.—Common in the Dee, Severn, and some tributaries. Unknown in Ireland.

BATRACHIANS.

All the Newts occur both in Wales and Ireland, but the Common Frog is said not to be indigenous in Ireland, although known there for the last two centuries; whilst the Toad is absent from that country.

REPTILES.

St. Patrick is popularly credited with having banished all Reptiles from the Emerald Isle. The only species found there is the Common Lizard. The Adder, Ring Snake, Blindworm, and Sand Lizard are unknown in that country. In Wales all except the last-named are common.

MAMMALS.

MOLE.—Abundant in all parts of Wales. Unknown in Ireland.

COMMON SHREW.—Abundant in the lowlands of Wales. Unknown in Ireland, where its place is taken by the Lesser Shrew—a rare species in Wales.

WATER SHREW.—Not uncommon in the Welsh lowlands. Unknown in Ireland.

SEROTINE, BARBASTELLE.—Neither of these Bats occur in North Wales, though found further south. They are unknown in Ireland.

NOCTULE.—Common in Wales. Recorded in N.E. Ireland, but probably in error; no recent occurrence.

GREATER HORSESHOE BAT.—Two examples have been recorded in North Wales, and it is common in certain parts of the South of England. Unknown in Ireland.

POLECAT.—Formerly common, and still met with in fair numbers in the wilder parts of Wales. Unknown in Ireland.

WEASEL.—Common in Wales. Unknown in Ireland.

STOAT.—Common in both countries, though the Irish Stoat is by some zoologists regarded as a distinct species, *Putorius hibernicus*.

WILD CAT.—Extinct in Wales. Unknown in Ireland, though it probably occurred early in the historic period.

COMMON HARE.—Common in Wales. Unknown in Ireland,* where its place is taken by the Irish Hare—a form of Mountain Hare. This last has also been introduced into Wales.

DORMOUSE.—Fairly common in the eastern counties of Wales; rarer in the west. Unknown in Ireland.

HARVEST MOUSE.—Of rare or doubtful occurrence in Wales and the neighbouring counties. Unknown in Ireland.

FIELD VOLE, BANK VOLE, WATER VOLE.—All common in Wales. Unknown in Ireland.

ROE DEER.—Extinct in Wales in the wild state. Unknown in Ireland.

A glance through the above list reveals some striking anomalies. The absence of Snakes from Ireland is so familiar that it passes without comment, but that there should be no species of Vole, no Mole, no Weasel, nor Polecat is indeed remarkable.

In my former paper on the Birds of the two countries I refrained from offering any theory to account for the facts. May not the successive cutting off from the mainland of, first, Ireland and then Great Britain, account for some of the phenomena?

Take, for example, such a comparatively sedentary bird as the Tawny Owl. May it not have established itself in Great Britain whilst still connected with the Continent, but after Ireland had been cut off by the sea? The same argument might apply to the Woodpeckers and other birds that do not habitually cross the sea or perform regular migrations. The idea is not a new one. It has been advanced by several writers, but more particularly by Mr. Charles Dixon in his book on the 'Migration of Birds,' in which he applies it as a principle to account for the routes taken by birds on migration, these following the ancient land-connections between North Africa and South

* Introduced recently into Ireland.

Europe, &c., by inherited instinct. Their ancestors of long ago originally took this route because it was over land connecting the northern and southern countries which they inhabited respectively in the warm and cold seasons of the year, till the following of this route at each returning time of migration became a fixed habit with the whole race.

Applying this to such a species as the Tree-Pipit (common in North Wales, but unknown in Ireland), we might suppose that this bird extended its range to Britain whilst still part of the European mainland, but after Ireland had become an island. When Great Britain became also an island the Tree-Pipit continued to come to its native district from force of habit, but never went on to Ireland, because the instinct to go there had not been implanted in the species by old custom. Of course, all this is theory, but it certainly accounts for much that is puzzling in the geographical distribution of birds in these districts.

I have to thank Capt. G. E. H. Barrett-Hamilton for revising the notes on the Mammals of Ireland.

NOTES ON THE ORNITHOLOGY OF OXFORDSHIRE,
1907.

BY O. V. APLIN, F.L.S.

January 9th.—Mistle-Thrush singing.

11th.—A Kestrel at Swalcliffe.

13th.—Song-Thrush singing, the first this year.

15th.—Song-Thrushes have returned in some numbers, and burst into song at once.

19th.—Bullfinches have been numerous this winter, and very destructive to the buds, but there have been fewer about since the December snow.

22nd.—Wind to N.E., and temperature fell rapidly. Early in the afternoon a small flock of Peewits, in boomerang formation, passing over and going at a great pace down wind, showed what weather was coming. The weather from this date was severe until Feb. 9th, and cold until the 15th. A week later there was another short spell of frost. About 8.30 p.m. a Brown Owl was sitting on the point of small flagstaff in front of the house. This point is several inches long, and about the size of an average little finger.

26th.—Song-Thrushes hard up, but have not gone again. Great flocks of Larks.

27th.—Coal-Tit with spring note.

February 6th.—Birds feeding greedily on holly-berries, and Redwings within three feet of my window.

7th.—A lot of Wild Ducks reported flying over Banbury this evening.

9th.—Milder weather. Song-Thrush resumed song.

10th.—Lark sang for first time since autumn.

11th.—Stock-Dove cooing. Song-Thrushes tried to some extent to outstay the frost, and are here now in lessened numbers; one picked up dead. Fieldfares, about the 6th inst.,

having cleared off the holly-berries in gardens, disappeared. Red-wings have been very scarce since the December snow. Some Blackbirds left. Some Mistle-Thrushes either left or died.

22nd.—Crows pairing.

27th.—Chaffinches and Blackbirds opened song; a Brimstone Butterfly seen.

28th.—Nuthatch, with rapid trill, at Wickham; we have none here now.

March 6th.—Yellow Bunting singing. Peewits, with breeding notes, on the arable fields. Rooks have some big nests; they usually begin cawing about the nests about the middle of February, or, as an old man said, “about bean-sowing.”

10th.—Thermometer 50° in shade for, I believe, the first time since Nov. 29th.

12th.—Apricot blossom.

18th.—Seven or eight Golden Plovers in Cherwell valley opposite Bodicote.

20th.—A daffodil in flower under south wall.

22nd.—Some Fieldfares have returned.

24th.—Wheatear in ploughed field on Milcomb Hill, and a few fresh-looking Meadow-Pipits.

26th.—Three *Turdus* nests building.

27th.—My son Gilbert heard the Chiffchaff at the back of the house, where I heard it next day.

28th.—Examined a Crested Grebe in full plumage, shot at Tusmore on the 25th. It weighed $2\frac{1}{2}$ lb.

April 4th.—Mistle-Thrush's nest with three eggs.

10th.—Some silent Willow-Wrens.

14th.—The Thrush family and Starlings now feed largely on the abundant crop of ivy-berries, and their droppings, full of seeds (which turn pink), are very remarkable. The berries are so well ripened that they drop off easily, and lie thick under some trees—a circumstance I never noticed before. A good and well-ripened crop of these berries is a most important thing to fruit-eating birds in cold spring weather.

15th.—A Water-Rail picked up near the railway station here, having evidently struck the wires.

16th.—Two Peewits' nests, with four eggs each, substantially built of old stubble, and one of them forming a conspicuous

patch at a distance. They were in fields of young barley, and would probably be destroyed by the roll. Redstart.

21st.—A Swallow about my buildings.

22nd.—Common Sandpiper near Adderbury.

23rd.—Whitethroat and Tree-Pipit. Song-Thrush's nest with *six* eggs in shrubbery.

25th.—Chiffchaffs unusually abundant.

26th.—Cuckoo.

29th.—Ray's Wagtail.

May 2nd.—Have only heard the Cuckoo on two days.

5th.—Two pairs of Swallows arrived about their nesting-places. Up till to-day I had only seen four birds this spring. The next day they were in numbers all about.

6th.—Sedge-Warbler.

[Left England until 24th. I have had news of a Snipe's nest found in South Oxon in April, and several other birds seen in April and May. Also of a pair of Bitterns seen and heard, and another seen a few miles away in the same district in May.]

27th.—A Water-Rail reported as seen at Wickham Mill yesterday.

29th.—Quail calling on east side of the village.

Rain in May nearly $3\frac{1}{2}$ in.

June 1st.—A deluge of rain. At Oxford it is said that .95 in. fell in twenty-five minutes.

3rd.—Ray's Wagtail is rather more numerous than it has been for some years. Floods.

5th.—Two (? pairs of) Nightingales in the parish this year.

7th.—A second Quail near the village.

8th.—Nightingale's nest in the oak spinney on the Grove estate. Placed under a thorn-bush, on a very bare bank covered with dead oak-leaves; fixed in the forking shoots of a briar. Quite exposed, and yet very difficult to see, as it was made externally of the same oak-leaves. The bird flitted off close to me, but it was a quarter of an hour before I found the nest! Internally the nest was formed of felted decayed leaves, and lined with a little grass and hair. It contained one newly hatched young one, one damaged hard-sat egg, and one addled egg down in the bottom of the lining. This cold wet season will cause

many small hatchings. The male was singing three days before, but to-day I only heard the high clear "whit."

9th.—A Linnet's with five eggs in an ivy-covered arch in the garden—a curious position.

18th.—The Redshanks are reported as breeding at their old place, and others a few miles lower down the river. Others have been seen on Otmoor, and one of them, which I afterwards saw, was shot about the latter end of May.

A very cold and cloudy and rather wet month. In the longest evenings the birds sometimes left off singing twenty-five minutes before their usual time. Red-backed Shrikes have bred or been seen about their three or four usual haunts here.

July 11th.—The weather this month, so far, almost wintry.

15th.—Saw at Oxford a locally taken Reed-Warbler's nest containing three eggs, and a Cuckoo's with a distinct bluish tinge in the ground colour.

17th.—In the flat uplands north of Wroxton saw a female and a male (not one pair) Red-backed Shrike. Many Corn-Buntings about there. Mistle-Thrushes flocked.

19th.—Two Nuthatches at Great Tew. Chiffchaff still sings. A flock of Starlings descended early one morning this summer on a patch of strawberries just ready to gather near the station here, and cleared them all off.

28th.—A Nuthatch in the big oak here. It is now a long time since any were seen here.

About two inches of rain fell on thirteen days this month.

August 6th.—Song-Thrush sang, 4 a.m.

8th.—Young Bullfinches now about the garden. The old birds, I believe, have bred both in front and at the back of the house. Last year there was a nest in a box-bush.

10th.—Among the swarm of Swifts in the air this evening it was easy to detect young birds by their shorter, less curved, and proportionately broader wings.

11th.—Great numbers of Swifts on the wing.

13th.—Many Garden Warblers in garden now. They certainly are eating insects and caterpillars as well as fruit.

17th.—Some diminution in the number of Swifts, but still quite a number here. Coal-Tit with spring note.

19th.—About a score of Swifts. Harvest began here—oats.

25th.—Many House-Martins on the roof nearly every morning since about the 10th. A great deal of Robin song now.

29th.—A few Swifts every evening up till to-day, when I could only see one.

30th.—A brood of young Bullfinches about the garden constantly cry with a husky creaking “peep,” quite different to that of the old ones. In the nest-dress the top of the head is brown, face, throat, and neck warm brown.

Rain this month over two inches on seventeen days. A most cold, ungenial summer.

September.—Blackbirds have been most destructive to apricots and plums.

3rd.—A flock of a dozen Corn-Buntings.

10th.—So far as one can see (so little corn cleared yet), a very bad Partridge year—probably the worst since 1879. No Meadow-Pipits in the roots yet.

13th.—Still none. Great congregations of Martins on the roof now. A record crop of plums, the trees breaking down under the weight of the fruit. Blackbirds simply live on them.

18th.—In two small adjoining pieces of clover four Land-Rails flushed and killed; all young birds, but certainly not bred here. Some Meadow-Pipits in the roots for the first time.

20th.—No Martins on roof for several days, and less about.

21st.—I think a great part of our Swallows and Martins have already gone.

23rd.—A flock of about two hundred Peewits on uplands near Barford.

27th.—Chiffchaff singing.

28th.—A good many Martins on roof this morning, probably composed of a second batch of broods.

30th.—I heard at 7 p.m. the unmistakable cry of one or more Oystercatchers passing low down over my garden; dark and cloudy evening.

Fine warm month.

October 3rd.—Large gathering of Martins on roof, and I think no further diminution in numbers yet.

7th.—Great many Swallows and Martins congregating in afternoon.

8th.—Wren sang.

9th.—Report of Woodcock killed in first week of month.

12th.—Harvest late ; beans still being cut. A few Swallows and Martins here.

15th.—Six or seven Martins together.

16th.—A very heavy rainfall, causing floods.

19th.—Two Martins.

21st.—A Ring-Ouzel near Tew. Lots of Tortoiseshell Butterflies about.

24th.—Great many Starlings hawking for flies in the warm noon.

25th.—About a score of Fieldfares flew over, going S.W.

27th.—News of a Peregrine killed at Stanton Harcourt, and another adult at Middleton Stoney Park during the past week ; both, from their size, appear to have been females. Also of an adult male and a young Hobby, killed about a month or six weeks ago near Sandford, where I have no doubt they bred.

29th.—Song-Thrush sings a little.

Nearly $5\frac{1}{2}$ in. of rain this month ; wind chiefly from S.W., and season very mild.

November 3rd.—Some plums still on wall-trees.

13th.—Wood-Pigeons only just fully fledged.

16th.—Song-Thrushes singing fairly well the last week.

21st.—Redwings for first time.

25th.—A good many now.

28th.—Heavy floods.

29th.—When we were having a stubble-field at the top of the hill above Milcomb gorse driven, the beaters sent a Jack-Snipe (which was killed) over the guns. Later, when walking another stubble on a hillside, another got up at our feet. A Wood-Pigeon only just full-feathered.

Rainfall about $1\frac{3}{4}$ in. ; wind N. to a great extent.

December 4th.—Heavy floods.

8th.—Report of a young (live) Hobby in Oxford Market, said to have been taken near there.

13th.—Many Fieldfares and Redwings ; a good crop of haws. Rooks have built many nests this autumn.

17th.—The floods at Oxford are very large, and it is nearly isolated on three sides.

20th.—Song-Thrushes fairly numerous and in good song.

21st.—Winter aconite in flower.

23rd.—Mr. Calvert writes that a few days ago, when he was waiting for Wood-Pigeons at Potter's Hill, a Merlin came and sat in a tree near him.

27th.—Hardly a Fieldfare to be seen now.

28th.—A bitterly cold day, E.N.E., and weather cold and dry (except a little snow) until end of the year. Temperature nearly the same day and night. Song-Thrushes find a few *Helix aspersa* to hammer.

Rain on sixteen days to amount of $3\frac{1}{2}$ in. ; wind chiefly S.W. until nearly the end of the month.

SOME OBSERVATIONS ON BUTTERFLIES AND HORNETS (MADE IN FRANCE).

BY EDMUND SELOUS.

July 9th, 1908.—For the last few days I have watched hornets and butterflies feeding on some of the copious exudations of sap from the bark of a small, lopped, stunted oak-tree, of no very healthy appearance. The outflow, after fermenting, to appearance, and bubbling, forms, here and there, a white substance, in much the same way, apparently, as foam is formed along the seashore. It is more substantial than this, but of a very flimsy solidity, if solid at all, properly speaking. It is this that the hornets (as huge ones as I have ever seen) principally come down to feed on, and they are evidently very fond of it. One will not suffer another to feed at the same place with her. Sometimes one, coming, is driven away by one already there, or the latter may be displaced by the new arrival. Two often oppose each other, in the air, flying round and sometimes against each other with a deep, portentous hum, not pleasant to hear. But I have not seen them actually close and use their stings, so may doubt if they would ever go so far. But apparently they cannot eat amicably, side by side, or even a small space apart, as wasps will do. Butterflies—especially now Red Admirals, but also the Great Tortoiseshell and others—also very much affect these exudations, and, strange to say, the hornets are a good deal worried and molested by them, though not in equal degree, by all. They dash at and fly round about them, in a bold buccaneering manner, as they approach or quit the tree, but not when they are quite near it and about to settle, or after they have settled. But time after time, to-day, I have seen them thus attacked, as I may almost call it, when properly on the wing, and almost always by one of the Red Admirals, though once a Great Tortoiseshell did so, but not so effectively. The butterfly dashes right at the hornet, very swiftly and impetuously, and then all round about her, with rapid retreats and fresh darts

in—a spirited, dashing performance—but never, I think—that is, as far as I have seen—actually touches the quarry, which, however, is much worried, and, owing to these Red Admirals' much greater powers of flight, quite unable to retaliate. She seeks only to get away, either making for the tree, to which she is not close followed, or getting under full flight for home or elsewhere, when the annoyance soon ceases. It is during the heavy uncertain circling in the neighbourhood of the tree that she is most liable to be thus molested.

What exactly the mental attitude of the butterfly is, when making these sallies, it is not quite easy to say. It looks, however, more like light-hearted gaiety and frolic than real hostile feeling towards a rival or possible enemy, which last, however, it may be; even amongst birds enmity has sometimes the appearance of sport or play. It is curious to see so formidable and formidable-looking an insect as a hornet thus bluffed, as it were, by a butterfly, but the fact is interesting also, in another way, since it shows that butterflies have perfectly good and accurate eyesight, and can distinguish form as well as colour. To dash at a hornet in flight, nearly but not quite touching her, and then to keep dashing about her as she moves, annoying, worrying, almost assaulting, but always just avoiding her, there must needs be perfect definition of the hornet's outline, and quick and sure following of her movements. Further convincing evidence of this fact, which is doubted by Mr. Scudder, has been furnished by Bates,* Belt,† and Mr. Scudder‡ himself, as it appears to me. If these bold butterflies (always I am speaking of the Red Admiral) do not much fear a hornet in the air, neither do they appear to do so when settled on the tree to which they have been attracted, and imbibing its juices. Thus I have observed the following:—

(1) A hornet, thus occupied, was driven away by one of them flying down upon it, then, returning to the charge, over the

* Aerial dances of the *Heliconii*, wherein no two individuals ever touch ('Contributions to an Insect Fauna of the Amazon Valley,' Trans. Linn. Soc. vol. xxiii. p. 495).

† The easy threading, by certain butterflies, of a maze of spiders' webs ('The Naturalist in Nicaragua,' pp. 108–9).

‡ Flying off to fight and returning to the same twig or stone ('Frail Children of the Air,' p. 183).

trunk, was, for some time, kept at bay by repeated quick, powerful flaps of the large painted wings ; but, at last, continuing to advance, open-jawed, the butterfly decamped.

(2) A hornet about to settle on the spot where a Red Admiral sat in possession was driven away by the latter thus flapping its wings.

(3) Another hornet, or possibly this same one, flying up again, puts this same butterfly to flight.

It is by flapping their wings in this manner that these butterflies drive off flies and bluebottles that come near them whilst they thus feed on the tree's sap, and though a hornet, as might be expected, is able, at last, to impress her personality upon them so as to put them to flight, it seems pretty plain that they do not see in her anything very terrific or dangerous—in other words, her “ warning coloration ” is apparently lost upon them. But this is not strange, since, unless habitually preyed upon by hornets, butterflies would not have learnt to fear them, and even so, how should any individual learn, except by seeing the fate of his fellows?—for if once seized he would be killed,* and if missed would probably hardly take alarm. Birds, indeed, might learn by individual experience, yet how many—except some few species which may do so habitually—ever attack a wasp or hornet? Is their fear to do so, then, instinctive? But even say that it is, how can such instinctive fear have been acquired except as the inherited offspring of individual experience? and since every new course or habit must demand some corresponding new movement—or change—in the brain, would not this, transmitted, through inheritance, be an acquired character? There appear to be difficulties in the practical application of the warning coloration theory which do not apply to that of protective resemblance, including what is called mimicry. Again, birds appear to avoid bees, the colours of many of which are not of the warning kind, as much as they do wasps, nor is the one class less mimicked than the other. There are many brown bee-like flies.

I had, also, to-day, repeated object-lessons in the pugnacity of these hornets, no two, as remarked, ever feeding in the same place, but the newcomer either driving the first-established one

out, or being herself driven away by her. One frequent visitant was especially fierce, on one occasion making a most venomous rush after the intruder to some way beyond her preserve, and she then appeared to me to try and sting her, and possibly may have done so. The one thus used crawled for some time on the trunk in a way which seemed compatible with this view, and the day before I had observed another on a heap of potato-plants, on the ground, that for some while was unable to raise herself and fly to the tree. Possibly the sap on which she had been feeding may have had a stupefying effect on her, but I have not seen other evidence of this. This ill-temper and intolerance cannot prevail in the nest, and, as hornets are not so very common, it seems likely that all those visiting this tree belong to the same community. If so, it would seem that the bond of sisterhood ceases beyond the city walls.

July 12th.—Since the last entry I have made a daily visit to this tree, and it is curious that I have not again seen any well-marked case of a hornet being flown at in the way I have described, either by a Red Admiral or other butterfly, though there are as many here as before. As this kept on taking place on that day, over and over again, all the time I was there, within a few yards or even feet of me, and was plain beyond all possibility of mistake or misinterpretation, I do not know how to account for the difference, but with birds, too, I have constantly had the experience of one day being no criterion for others, so that caprice would seem to enter more into animal life than is generally imagined. Had I seen any butterfly suffer for its temerity, this change would have interested me, but I did not, and even, if I had, it could hardly pass for an explanation.

Two butterflies—both, I think, Red Admirals—were displaced, by hornets, from their feast to-day, and certainly with much less ado, but this may have been mere accident.

July 14th.—The hornets that I have hitherto been observing are of great size (though no doubt *Crabro vulgaris*), considerably over an inch in length—to judge without measuring—and bulky in proportion; but to-day a much smaller kind, hardly half their weight I should think, yet identical, as far as I can see, in every other respect, have made their appearance. Yet even these look more than twice the bulk of an ordinary wasp—they are con-

siderably larger than a queen wasp. There was a good deal of antagonism between this smaller sort and the larger ones, and it seemed, at first, as if the new-comers were the bolder and more pugnacious of the two. They frequently flew at the other kind, and, being nimbler on the wing, teased and annoyed them a good deal—to the extent, indeed, that sometimes these large hornets were chased by the smaller ones, whom they seemed to fear, or, at least, to be glad to avoid. This, however, was in the air only. On the tree they gradually established themselves as predominant, being able to expel undersized intruders on any coveted spot, whilst remaining there themselves, though often bothered by them. I believe these small hornets are more formidable to butterflies than the great ones. Several times they have darted angrily at them, when on, or hovering about, the place they wanted to come to, and once out of the corner of my eye I saw one fly from the tree, in a slanting line, to the ground, evidently borne down in some way which I could not distinguish. Almost immediately afterwards, however, as I turned and saw clearly, a Red Admiral butterfly struggled out of the grass, and the hornet rose, a second or two afterwards, from about the same place. I imagine that the hornet had seized the butterfly, and come down with it in this way, when the butterfly had managed to disengage itself and fly off uninjured—for I could detect no sign of injury. Otherwise the hornet, falling for some other reason which I cannot suggest, must, by coincidence, have pitched on, or almost on, a butterfly, in a not very usual place for one of the kind—in the midst of some tangled grass, that is to say. Yet it seems strange that, if this hornet had really a butterfly in its grasp, I should not have detected this, but only that (as I thought) it was hampered in some manner, and constrained to fall. But I was watching something else, and it was only, as I say, the merest glance out of the corner of my eye. As it was early in the day, and these small hornets were quick, brisk, and entirely sober in their movements, as was this particular one also after flying back to the tree, I am sure that partial intoxication, produced by the sap it had drunk, had nothing to do with the incident.

July 19th.—Yesterday, or the day before, I visited the tree again in a high wind, as also to-day, which is windy, too. Possibly for this reason I saw no large hornet there on either occa-

sion, but only the much smaller kind. If the high wind has nothing to do with their absence, then I can think of no other cause for it except that the smaller hornets have driven the large ones away.

I have noted, now, what I before had a hint of, namely, that these small hornets are amicable with one another. Several times two have fed together, and, on each occasion, I thought I saw them touch antennæ, like ants, but whether they did this or not, there was an unmistakable little movement—a sort of start or thrill—of mutual recognition and tolerance, such as I have never seen between the larger hornets, who uniformly drove one another away. It is true that one of the various pairs who thus, several times, fed together, never stayed more than a very short time (perhaps because the other had the best place), but there could be no doubt whatever as to the friendliness of their feelings, of which their close proximity alone—once almost, if not quite, touching—was a sufficient evidence. This is what one might expect with inmates of the same nest, but can all these large hornets be from different nests? It is too late in the year, I suppose, for them to be queens—as from their size one might almost imagine—and, even were it not, who would dream of seeing some six or eight hornet queens together? If then, as seems most probable, they represent but one nest in the neighbourhood, there is a marked difference, as between the two species, in the strength of the social tie which binds together the members of the same community.

I saw several examples, this afternoon, of boldness in butterflies (Red Admirals and Large Tortoiseshells) with these smaller hornets. They advanced right up to them, on the tree, flapping their wings, with the idea, it seemed evident, of driving them away, and though they always, in the end, flew off themselves, yet evidently they had no precedent fear of these formidable insects. The theory of warning coloration certainly receives no illustration in their case. It also struck me that the Great Tortoiseshell butterfly, by closing—that is to say, putting up—its wings, so that only their dark under surfaces were visible, ceased to be noticed by the hornets, though there was little or no sign of its doing so, instinctively, in relation to such an end, when in proximity to any one of them. But the habit is a

frequent one, and the disappearance, by it, of the butterfly in question, when sitting on this tree-trunk, almost as complete, sometimes, as in the case of the Leaf Butterflies of India and the Farther East.

These smaller hornets were still on the tree to-night, after dark, at about nine, but neither then, nor during the daytime, did I see any of the large ones.

July 20th.—To-day, during a space of time in which formerly some half-dozen would have visited and kept flying about and feeding at it, one only of the larger species of hornet came to the tree, and, flying down on a particular spot where they had all been accustomed to feed, alighted, incidentally, right on one of the smaller kind, who was busy there. As a result of this, the large one incontinently flew right off and away, and did not return; nor did any others of her kind make their appearance whilst I was there. Now, in a similar *rencontre*, during the first day or two after the arrival of these smaller hornets on the scene, the latter would have flown to some other place on the tree, and the larger kind have established themselves in their room, or, if not at once, would probably have returned and done so, or even if ousted (but this was not the course of things) would have remained to feed elsewhere. This frank retreat, without even any preliminary circlings about the tree, but straight away, is unprecedented, in my experience hitherto, except once under quite different and artificial conditions, and that was when I rubbed with a Japanese *menthal*, which I had, a certain spot on the tree, to which one of these large hornets (there being then no other kind) was in the habit of coming. The instant after alighting she flew off in a straight line, without stop or stay, exactly as did this other. From the above incident, and their absenting themselves shortly (though how shortly I cannot say) after the arrival of these smaller hornets, it would seem as though the latter were in some way obnoxious to *Crabro vulgaris*. That these are pestered by them I have myself seen, though I should not have thought it was to the point of their leaving such dwarfs in possession.

July 21st.—A Great Tortoiseshell came and drank for some moments at the same place with a hornet, before the latter drove it away, with a hostile demonstration. The hornet was

there first. Thus, again, it is evident that there is no initial instinctive fear of hornets on the part of these butterflies. That they give way, after a certain point, is what might be expected of an insect that is not a fighting one at all, and unprovided with any kind of weapon whatever. But they seem to have no more special fear of a hornet than of a fly or beetle, often letting it come right down upon them, as they feed, before flying away. The hornets often come down upon one another, also, in this way.*

I have seen fresh evidence, this afternoon, of the good fellowship of these lesser hornets, when two (I have not seen more) meet together at the same place, though, as before remarked, they never feed long thus, one soon shifting its quarters. But there is, each time, a distinct act, or emotion, of recognition, following on contact, or close proximity, after which their conduct is quite amicable; and even before, whilst they only expect one another, there is no very threatening deportment. In all this they differ from the larger kind, whose behaviour, in this connection, was always as before described. Yet it seems most unlikely that all of the six or eight, perhaps, of the latter were from different nests—the small ones, some four, or perhaps half a dozen, no doubt belong to the same.

That the numbers in each case are not very much greater appears to me to be strong evidence (without any experiments) that these hornets are not capable of communicating the intelligence of this tree, which they find so attractive, to one another, or even of inducing a comrade to accompany them thither. The nest is evidently too far away for many to be led to the feast by observing and following the flight of others, and thus, out of the whole community, only a few units have by accident come upon it; yet these are more, probably, than would be the case were the tree at a great distance. But if news could be brought to the nest, or the mere signal "Follow me" be given, there would be a continuous stream backwards and forwards. It is difficult, therefore, to imagine an experiment more decisive, for that the

* As such a mistake always seemed to worry the maker of it, it may perhaps be taken as evidence of bad sight on the part of hornets. Yet surely they should see each other in bright sunlight even though quiescent. Impetuosity might partly explain it.

sap exuded by this, probably, diseased tree is peculiarly attractive there can be no doubt. There were, for instance, at one time, this afternoon, six of the Large Tortoiseshell butterflies settled on its trunk, at the same time, either feeding or looking for a place—a beautiful sight to see, for the wings of several, if not all, would often be spread to the sun at the same time. Various flies, too, are always about it, and I once saw a Rose Beetle apparently feeding, for a hornet of the large kind, coming to the same place several times in succession, walked over him, each time, without appearing to notice he was there—the beetle keeping perfectly still. When the evening falls a number of moths—small for the most part—take the place of the butterflies.

I have only seen one other tree—also a small lopped oak—from which there was a similar but much less extensive exudation, and here, too, there were two or three Red Admirals gathered.

Some days after this I noticed that the flow of sap from this tree was much diminished. In consequence, the smaller hornets were not coming so frequently, but, a little later, the flow had again increased, and was much the same as before. They were then correspondingly busy, but I did not again see any individual of the larger kind. The failure of the sap is felt by the hornets much sooner than by the butterflies, no doubt because the slender proboscis of the latter is enabled to deal with it in quantities, and in situations insufficient or impracticable for the latter.

NOTES ON THE HAIRY ARMADILLO (*DASYPUS VILLOSUS*).

BY LIONEL E. ADAMS, B.A.

RAMBLING lately in the wild country up the River Parana, I made the acquaintance of this interesting creature in the following manner.

On the cactus-covered plain I frequently came upon congregations of mounds of sand about the size of large moles' fortresses, and evidently formed in a similar manner, *viz.* by ejection from subterranean workings. The entrances to the burrows from which the material had been ejected were at the bases of the mounds, and were almost invariably blocked up, quite unlike the large open-mouthed burrows of the Vizcacha with which I was acquainted. I failed to find any footprints on the hard ground, but often found excreta resembling that of rabbits but larger. I made inquiries of the country people, and was told that the animal which made the mounds was called "Touc-Touc." I was, of course, no wiser than before, nor was I more enlightened when a comparatively educated man told me that the "Touc-Touc" was the same as the "Peludo." This word I found in my Spanish dictionary to mean "an oval hairy mat," not a bad descriptive name for the species in question, though at the time I did not recognize it as such. Some of the Guachos called it the "Quirquincho," a term borrowed from the Indians of the Chaco.

However, one day, while walking among some fresh heaps, I heard a mysterious sound—"Touc-a-touc, Touc-a-touc, Touc-a-touc, Touc, Touc, Touc"—very difficult to locate. Listening carefully I approached the direction of the sound, when suddenly it ceased. I sat down on a heap to watch and listen, and presently the sound began again about ten yards away in a different direction. As I listened I perceived that it came from underground, and I recognized the appropriateness of the

mimetic name "Touc-touc." I was still, however, unable to identify the animal. Presently I saw the earth at the base of a mound become disturbed and sprays of earth fly upwards upon the mound, resembling the showers of earth ejected by a terrier in a rabbit-hole. The sprays ceased after about half a minute, and a small head was popped up and instantly withdrawn, leaving me still unable to identify the owner. The fact was that I was expecting some furry animal "like a rat," as the Guachos had described the animal to me. I asked one of these men to get a spade and dig one of the animals out for me, but he explained that the tunnels ramify in all directions for thirty or forty yards, and that the animals can burrow faster than the spade can follow. However, he offered to catch one for me that night, and next morning brought me a specimen of the Hairy Armadillo.

I learnt later that they are easily caught by men who watch for them near their burrows at night when they come forth to feed; in the daytime they rarely show themselves. The name Armadillo is not known in the "camp," as the wild country is called, and few people know the term even in Buenos Aires, where it is called "Meluta."

I brought my captive on board and installed him in a barrel half filled with sand; every day throughout the homeward passage I took him for a run about the deck and gave him his dinner. As to food nothing came amiss—any boiled vegetables; ship biscuit, which he easily crunched with his horny jaws; tinned meat; toast; rice-pudding; but what he liked best was raw meat, which he would come and take from my hand if he was near enough to smell it. His power of sight seemed very poor, and he always seemed to notice the proximity of food by scent. He grew fairly tame, and when I used to visit him in his barrel to take him out for his daily run he would scramble towards me with a great display of excitement.

The natives say, and I think rightly, that the sound "Touc-a-touc" is made by stamping or digging in the burrows. The only vocal sound I ever heard my captive utter was a snuffling whine of delight when I gave him slugs and snails (*Limax maximus* and *Helix aspersa*) in my garden in England. The preference for snails is odd, because there are no land mollusca on the arid

plain where the Armadilloes live. The natives say they come at night to feed on remnants of slaughtered cattle, but their natural food is said to be grubs which they dig up with their powerful claws. I had no opportunity of testing my captive with a snake, but I can imagine that snakes are often killed and eaten, as Hudson describes in his 'Naturalist on the Amazon.' My attention was drawn to the probability of this as one day I drew a piece of rope across him, when he turned and seized it with a sudden quickness I should not have thought possible.

In the Argentine the Armadillo is considered a great delicacy, and is said to resemble delicate pork in flavour; about ten shillings is the usual price.

Fancy baskets are made of the carapace in Buenos Aires. I have seen these baskets in England where they are often supposed to be the shells of crabs!

ROUGH NOTES IN EAST SUSSEX IN 1908.

BY HUGH WHISTLER.

AMONGST the woods and hills of East Sussex, within sight of the South Downs that form Beachy Head, is situate one of those happy hunting-grounds that warm a naturalist's heart—an old English deer-park. The scene of these random notes (Ashburnham Park) is a particularly fine example of its kind—a thousand acres of miniature hill and valley. A deer-park for centuries, it is well stocked with timber—grand old oaks and beeches, with a good sprinkling of elms, a few groups of firs and some fine stone-pines. In the midst, surrounded by bracken, is set a picturesque old grey house, wherein resides the deer-keeper for the time being. It was my good fortune to receive the noble owner's kind permission to wander at will over his property—a permission of which I was not slow to take advantage.

April 13th.—A fine sunny day tempted me to commence operations, and I rode my bicycle over to one of the lodges, known locally as "Tower Lodge" from its shape. In answer to my inquiry about Owls, the woman there told me that several were to be heard calling at nights in a big ridge of firs just outside the park. A man had been at work woodcutting there one day, and after a time had happened to look up and see two Brown Owls in a tree above his head, which must have been sitting there for hours undisturbed by the noise he was making. She also said that once she had been taken to see a nest of young Owls in some rocks in the park. Setting off along the coach-road I came to a stone bridge built over a stream, which runs between steep banks, in such a way as to dam it and form a small pond. This pond has a fringe of coarse rushes—an abode beloved of Waterhens; on one side the ground forms a steep and very high bank, leaving a path around the water. Here amongst the drifts of dry leaves a Snake and some Lizards were sunning themselves; the Lizards darted under the leaves,

while the Snake took to the rushes. As I followed the path round, a Wild Duck suddenly rose at my feet from a heap of the leaves, disclosing a well-concealed nest; the down and leaves were heaped so thickly that the eggs were scarcely visible. Thence to the "rocks" on the side of a slope; they were evidently still haunted by some bird of prey, as there were plenty of pellets and whitewash, while one ledge in particular seemed to be often used. A few Starlings nest in holes in the sandstone.

The groves of trees were alive with Green Woodpeckers and Nuthatches, and resounded with the laugh of the former and the "pretty dick, pretty dick, dick" of the latter. At one time three pairs of the Woodpeckers were in view near one another, all engaged in violent flirtations. In an old oak by the road there was a small hole, about three feet from the ground, which a Nuthatch had plastered up and filled with fragments of dry leaves, but as yet there were no eggs.

Later on I saw an oak in which was a big hollow rotted out above the lowest branches; on going nearer I perceived that the ground beneath was littered with large castings, two or three inches in length. This looked so promising that it seemed worthy of closer investigation, but how was I to get up? The tree, which was too big to swarm, stood on the edge of a bank, and its lowest boughs were several feet above my reach. Luckily several dead branches were to be seen lying about, and one of these I fetched and dropped at the foot of the tree. The crash brought out a beautiful Barn Owl, who flew into a neighbouring oak, whence, after turning his white face to have a look at me, he sailed away. This incident increased my enthusiasm, which was still further heightened, while I was collecting more branches, by the appearance of a second Owl from the hole. At last the pile was completed, and mounting on it I succeeded, with the aid of a twig about the thickness of a lead pencil, in getting my arms round a bough, when suddenly the erection collapsed, leaving me hanging in mid-air. Pulling myself up I found the bases of the boughs littered with more pellets which had overflowed from the hollow. The hole was thickly carpeted with broken pellets which gave forth an unpleasant odour, and on the sodden trampled mass reposed one white egg—a sight which

well rewarded my hard work. On several occasions I came again to visit this curious *ménage*. It was amusing to stand in front of the tree and make a noise which would bring a dimly-seen white head to peer from the hole, followed by the grand swoop of the bird as it left the tree.

Amongst the other interests of the park is a rookery; this, which consists of about seventy nests, is in two portions. There are a few nests in large trees in a hollow, while the most are in a fir plantation on the edge of a higher level some slight distance away. Climbing up to one nest I found it contained one egg and three naked youngsters, one of whom was noticeably larger than his brethren; from there I could pull another nest close enough to see that it contained one egg. As I left, one of the numerous Rooks that were in the air hovered high above the tree, and then, seeing its treasures safe, gave vent to a couple of "caws," exultingly as it seemed, before flying away again.

April 14th.—To the park again. A Stock-Dove flew out of a hole in an oak-tree, so I climbed up; inside was a slight nest of sticks and coarse grass-stems containing one egg. These birds are common there and nest in the numerous holes, but as a rule they are very hard to get at. One nest I found was at the end of a very tall rotten birch-trunk—quite unapproachable. Strangely enough Jackdaws are not as common as might be expected; I only remember seeing one—carrying a stick in its beak, though plenty are to be seen with the Rooks outside the park.

April 17th.—Spent the greater part of the day in the park. By sitting down and watching a pair of Nuthatches through my glasses I found they were preparing a small hole in one of the upper boughs of a fair-sized oak. I went up to inspect, and saw the wet mud pitted with little holes made by the point of the bird's bill. *Apropos* of Nuthatches, a pair brought off a brood this year in the circuit-wall of Battle Abbey above the pavement by the main road, yet scarcely any of the passers-by were aware of the fact.

About half a mile from Tower Lodge a Kestrel came out of an oak which had been broken off at some little height from the ground. At the top was an open hollow, strewn with castings, but as yet it contained no eggs. Close to the nest a Squirrel

came out from behind a gaping piece of bark, where it had a "seat" just like that of a Rabbit, made of moss and twigs. In another part of the park a second pair of Kestrels evidently had a nest—perhaps in a large elm whose top had also been broken by some storm. Both birds kept flying round, and once when they were near the tree I heard a typical nesting cry. An attempt to wait and discover their nest with certainty was frustrated by one of the pair who would insist on sitting in neighbouring trees and watching me, giving vent to screams at intervals.

Several pairs of Lapwings nest on the stretches of coarse grass around the deer-keeper's lodge, and one of the nests I found by coming up a steep slope and putting the bird off its nest about ten yards from the top. A short search revealed the hollow with two eggs.

April 23rd.—Visited the rookery again and examined several nests, finding incomplete and full clutches and young birds. One egg in the Kestrel's nest, a rather poor reddish brown specimen.

I was unable to visit the district again until June 4th, when I walked over but did not actually enter the park. Just outside the paling I met one of the keepers near his cottage, hard by Tower Lodge. In answer to my inquiry whether he knew of any nests, he asked what kinds I wanted to see. "Oh, Hawks, Owls, Nightjars, Kingfishers—anything interesting." He then said that he had just come from a wood where he had been "lying up" waiting to shoot a male Sparrowhawk by its nest. There were some big nests in a clump of larch-trees, and there two days before he had killed a female that had suddenly darted past, apparently off one of these nests. In order to kill both birds he should have shot the male first and then the female; as it was, he had almost given up trying for the cock, and had thought of putting a charge of shot into the nest that morning, but had finally decided to make one more attempt for the bird itself. He was just going home for dinner, but after, if I liked, would show me where the nest was. Accordingly we set off later, and after a long tramp reached the larches, where he pointed out the nest, which he considered occupied; it certainly looked promising; a big platform of larch and other twigs against the

trunk about half-way up a larch. So up I went, and with some trouble reached the nest, while the keeper contentedly sat and smoked below. Putting in my hand I felt eggs; then climbing higher, I could feast my eyes on five beautiful eggs, which I took. They were hard-set, and took about half-an-hour apiece to clean—it could not be called “blowing”—in spite of the man’s assurances that they would be fresh, as the Sparrowhawk never laid less than six or seven. Later on he found another nest on the same beat containing young.

We afterwards visited a wood bordering the high road, where the keeper told me there were Long-eared Owls, which he said had already safely brought off a brood. I flushed one in a fir-tree from a ragged old heap of fir-needles that might have once been a nest. Our attention was attracted by the screams of a Blackbird to another which was sitting up in a tree; he, disgusted by our admiration, flew away as well. The man also told me of a Kingfisher’s nest from which, I believe, a brood was successfully reared. The Deer in the park consist of Red and Fallow Deer.

NOTES AND QUERIES.

A V E S.

Nesting of the Lesser Redpoll (*Linota rufescens*) in Sussex.—Last year I reported the undoubted nesting of the Lesser Redpoll in the parish of Maresfield (Zool. 1907, p. 352), and am pleased to say that a pair again nested at the same spot this year. I first saw Redpolls there on May 19th, when there were either four or five apparently engaged in courtship. On the 21st there was one pair, the female collecting materials for building, which consisted of fine dead twigs of birch and willow-down, and on the 26th I discovered the nest in a small birch tree. On the 30th the female was sitting, but I did not examine the contents of this nest, thinking that any damage done to the tree would be likely to lead to its detection. I regret to say that the nest was robbed of the young birds somewhere between June 18th and 25th. However, as the birds remained in the vicinity, it seemed most probable to me that they would make another attempt to bring off a brood, and though I quite failed to find the nest, yet the female was there with the young birds on Aug. 4th. There need be very little doubt that others have bred in the immediate district, and on July 25th I met with a cock bird at a spot in the parish of Framfield, where the Lesser Redpoll has only been seen by me during the winter months hitherto.—ROBERT MORRIS (Uckfield, Sussex).

Early Flocks of Starlings.—Referring to the note on this subject (*ante*, p. 312), I do not consider June 21st an early date for young Starlings to be seen in flocks. In this part of the country the Starling is the first bird to gather into small flocks. Directly the young broods leave the nests they follow the old ones into the fields, and they prefer small grass fields surrounded by tall hedgerows. Here they meet with other broods, with which they join company, and as day after day other broods emerge the flocks grow to some size. It is now a good many years since I first noted down these facts. In 1884 young birds flew on May 18th, and I saw a flock of sixty or seventy birds on June 9th. In the previous year the young broods were following the old ones on May 23rd. In 1890 I saw a small flock of twenty or twenty-five as early as May 24th. With us the Peewit is the next

earliest bird to gather into flocks. In 1885 I saw twenty-two in a flock on June 6th, and in 1904 a small flock two days later. Then comes the Mistle-Thrush, which may be seen in small flocks (and never forms large ones—here, at least) in the first half of July. In 1883 I counted twenty-nine in a flock on July 8th, and in the following year, on July 14th, I saw thirty-nine together.—O. V. APLIN (Bloxham, Oxon).

Sandwich Tern on Breydon, Yarmouth.—While taking a trip on Breydon water with Mr. A. H. Patterson, the well-known Norfolk naturalist, on Sept. 3rd, we had the pleasure of seeing, on No. 16 stake, a Sandwich Tern (*Sterna cantiaca*). It allowed us to approach within about three or four yards of its resting-place; it then flew off in the rather leisurely manner which is apparently one of its characteristics.—FRANK A. ARNOLD (139, Hamilton Road, West Norwood, S.E.).

Prolific Breeding of the Dabchick (*Podiceps fluviatilis*) and late nesting of the Great Crested Grebe (*P. cristatus*).—On July 27th last I visited a pond in the neighbourhood of Oxted, to which several pairs of Dabchicks resort annually for breeding purposes. With the aid of my field-glass I detected a Little Grebe with two young, sitting upon a nest situated about thirty-five yards from the nearest bank, the parent bird leaving as I approached more closely, and being followed by her chicks, which experienced considerable difficulty, being but recently hatched, in forcing their way through the thick coating of "duckweed" which covered the surface of the pool. On glancing into the nest I was somewhat surprised at making the discovery that it contained a single egg, which from its unstained appearance was evidently freshly laid. A friend visited the locality on July 28th, and reported that a second egg had been deposited, and on the day following I accompanied him to the pond, but found that the number of eggs had not been increased since his last visit. Unfortunately a day or two later our observations were brought to a sudden termination by the nest being destroyed. There can be little doubt that this species frequently rears two, if not three, broods in a season, but the very rapid means of propagation recorded above must be somewhat exceptional. The normal laying period of the Great Crested Grebe appears to extend from April to June; it may therefore be of interest to record that on Aug. 2nd last I paid a hurried visit to one of the Surrey breeding haunts of this beautiful species, and was fortunate in discovering a nest containing four partially covered eggs, which I judged to be about half incubated. I should mention that at

the particular nesting-place to which I refer the Crested Grebes are protected, and this exceptionally late laying is not likely to have been occasioned by the repeated depredations of egg-collectors, although it is possible that earlier broods may have been entirely destroyed by Pike, of which there must be a large number in the lake.—C. H. BENTHAM (Oxted, Surrey).

Sabine's Gull.—On Sept. 1st a specimen of Sabine's Gull (*Xema sabini*) was shot on Breydon. There have been previously only about three or four records for this locality. —FRANK A. ARNOLD (139, Hamilton Road, West Norwood, S.E.).

Bird Notes from Yarmouth.—During the trip mentioned in my note *re* the Sandwich Tern, some other birds seen were a flock of about forty Knots (*Tringa canutus*), some Common Terns (*Sterna fluviatilis*), Ringed Plover (*Ægialitis hiaticola*), Godwits, Common Heron (*Ardea cinerea*), and several species of Gulls. There is very little to be seen in the bird line just now, the birds at the present time being harassed on all sides by gunners. Around us from almost every quarter comes the report of guns, sending destruction to any feathered creature that ventures within gunshot. I understand that from March 1st to Sept. 1st shooting is prohibited on Breydon. What a pity this protection is not extended over the entire year! Breydon would then become an ideal sanctuary for its feathered visitors. Perhaps this will be done in the future—*when too late*. —FRANK A. ARNOLD (139, Hamilton Road, West Norwood, S.E.).

Ringed Birds.—The winter quarters and routes of our migrant birds are as yet unknown, and there is only one method which leads to positive knowledge on this account: the marking of birds by aluminium rings, a method which has been tried with success in Germany and in Denmark, as a House-Stork marked in Pomerania was caught in Africa, 15° S. of the Equator. The Hungarian Central Bureau for Ornithology has now also begun the marking of young Storks, Herons, Gulls, and Swallows. The aluminium ring is fastened around the leg of the bird, and it bears in each case the inscription "Budapest," followed by a number which corresponds to the entry in the Register-book of the Hungarian Central Bureau for Ornithology. Anyone catching such a marked bird, or hearing of the capture of such, is kindly requested to send the ring to the Hungarian Central Bureau for Ornithology, József-körút 65, Budapest VIII., Hungary, accompanied by a notice stating the locality, time, and particulars of

capture.—OTTO HERMAN (Director of the Hungarian Central Bureau for Ornithology, Budapest).

PISCES.

Double Flounder.—On Sept. 1st a small boy, who had been fishing by the Yare-side for Flounders, brought me a very interesting specimen, $5\frac{1}{2}$ in. in length, both sides of which were of a sooty-black hue. The head was notched a short way behind the upper lip, as is somewhat common to "double" flat-fishes, and in this nick or notch the "right" eye remained fixed in such a position that a view on either side (did the fish swim in the vertical manner ascribed to freaks of this sort) was easily obtained by the fortunate (?) possessor.—ARTHUR H. PATTERSON (Great Yarmouth).

INSECTA.

The Jumping Bean.—Amongst the many wonders to be seen at the Franco-British Exhibition may be mentioned the so-called Jumping Beans, which have been imported from Mexico. These beans are apparently continually jumping up and down day and night. If one of these be cut open the reason is apparent. It is due to a small grub which lives within. As there is no hole in the bean through which the animal has bored its way, it is evident that the perfect insect must have laid its eggs in the flower, which, on ripening into the fruit, enclosed the grub. The most satisfactory reason so far offered to explain the meaning of this peculiarity is that the grubs instinctively feel that if they remain near the tree they will be attacked by some enemy. Now, it appears to me far more reasonable to suppose that it is a case of "symbiosis"—that is to say, that the plant and animal live together, so as to be of use to one another. Each bean as sold in the Exhibition is really only a third part of a bean, the other two parts each carrying a seed; and these two parts, I understand, are eaten by the natives, whilst the third is sold as the jumping bean. One advantage that the plant gets is that its flowers are fertilized by the perfect insect when passing from flower to flower to lay its eggs. It has been found that the grubs live longer if kept in a light and warm place. It appears to me, then, that this is a second advantage to the plant, inasmuch as the grub, in endeavouring to get into a warm and light place, naturally jumps away from the shadow of the tree into the light and warmth of the sun; thus the two seeds, borne away in this manner, obtain fresh soil and sunlight to commence their growth. They will be carried still further by

water, if the trees, as I believe, live in a morass. The advantage the grub gets is very obscure. That there is an advantage is clear from the fact that if a hole be made in the bean the grub, instead of trying to escape from its prison, does just the opposite, closing the window with a web. I should think that as the parent tree must be covered with these grubs, they want a fresh dwelling place, and they secure this by travelling with the seeds. As soon as the seed commences to grow the grub has a fresh tree to start on. But the life-history of these insects is essential before a reliable account can be obtained. As I have only seen the beans for a few hours, perhaps someone who may have kept and studied them will bring forward a more satisfactory explanation to account for this peculiar phenomenon.—J. P. LLOYD (St. Giles's Vicarage, Norwich).

[The creature inhabiting the bean is the larva of one of the *Tortricide* (Lepidoptera). According to Dr. Sharp: "There are, at least, two species of these insects, and two plants harbouring them, known in the United States and Mexico, viz. *Carpocapsa saltitans* living in the seeds of *Croton colliguaja*, and *Grapholitha sebastianiæ* living in the seeds of *Sebastiania bicapsularis*."—ED.]

EDITORIAL GLEANINGS.

BRITISH ASSOCIATION AT DUBLIN, 1908.—The meeting just terminated at Dublin was under the Presidency of Dr. Francis Darwin, whose Address, though largely dependent on botanical observations, was a reaffirmation of his distinguished father's position in the famous theory of Natural Selection, as distinct from much of the neo-Darwinism of the present day, and as opposed to many of the conclusions of Weismann.

The Zoological Section was presided over by Dr. Sidney F. Harmer, who devoted the larger part of his Address to the problems attached to a philosophical study of the Polyzoa, especially those relating to an explanation of the functions of the avicularia. For a proper estimation of this important zoological contribution the Address requires to be studied throughout, but the following extracts are a guide to the conclusions of its writer:—

"The decision of the principles on which the Polyzoa should be classified may not be a matter of immediate practical importance, but our theories of species cannot be regarded as established until they have shown themselves capable of explaining all the cases. Some modification of the Mendelian theory seems to me to be capable of elucidating the apparently haphazard way in which the several forms of avicularia are distributed in the species of Cheilostomata, and it

may perhaps be allowed to afford a working hypothesis that can be used in systematic study. The results of such a hypothesis would, I think, be far-reaching. Whether we are justified in accepting it provisionally or not, I am convinced that we require some hypothesis by which we may regard two specimens as belonging to the same species, even though they may differ in what might at first sight seem to be fundamental respects. And, *vice versa*, we require the liberty to regard two species as widely separated from each other in the system, even though they possess identical types of avicularia. There are other questions which might have been considered in the Cheilostomata, and, in particular, the presence or absence of oral or marginal spines and the forms and distribution of the ovicells. The occurrence of the latter is, however, probably connected with the presence in the young zoecium of tissue which will give rise to an ovary, and this implies the consideration of another factor which is very difficult to estimate.

"I must not conclude without at any rate referring to the fact that the Polyzoa are by no means the only animals in which dimorphism or polymorphism occurs as the result of blastogenic processes. But among the Cœlenterates, for instance, the occurrence of medusoid individuals cannot be considered apart from the question of sexual cells. There is, however, one series of cases among Hydroids to which allusion may perhaps be made. I refer to the existence of pairs of genera such as *Corymorpha* and *Tubularia*, *Syncoryne* and *Coryne*, *Podocoryne* and *Hydractinia*, in each of which pairs the two genera are distinguished by the fact that one produces free medusæ, while the other has sessile gonophores. There is already some evidence that the validity of these generic distinctions is open to question; and the free medusoid individual and the sessile gonophore might conceivably be related in such a way as to form members of an allelomorphic pair. The same phylum contains another striking example of dimorphism in the distinction between gastrozooids and dactylozooids in many Hydroids; while in the Siphonophora the differentiation of various forms of individual has advanced much further. But I have already gone much beyond my evidence, and I must bring my remarks to a conclusion by expressing the view that the causes which regulate the differentiation of the individuals during the blastogenic development of the Polyzoa are well worthy of further study, and that our knowledge of the unity of the vital processes throughout the animal kingdom gives us reason to believe that they are part of some general biological law."

A most timely protest was made by Mr. G. A. Boulenger "On the Abuses resulting from the strict Application of the Rule of Priority in Zoological Nomenclature and on the Means of Protecting well-established Names." Disapproval was expressed of the extreme application of the rule of priority, which in the author's opinion had brought about much mischief under pretence of aiming at ultimate uniformity. The author protested against the abuse to which this otherwise excellent rule had been put by some recent workers, encouraged as they were by the decision of several committees who had undertaken to revise the Stricklandian Code, elaborated under

the auspices of the British Association in 1842. The worst feature of this abuse is not so much the bestowal of unknown names on well-known creatures as the transfer of names from one to another, as we have seen in the case of *Astacus*, *Torpedo*, *Holothuria*, *Simia*, *Cynocephalus*, and many others which must be present to the mind of every systematist. The names that were used uniformly by Cuvier, Johannes Müller, Owen, Agassiz, Darwin, Huxley, Gegenbaur, would no longer convey any meaning, very often they would be misunderstood; in fact, the very object for which Latin or Latinized names were introduced would be defeated. It is all very well to talk of uniformity in the future, but surely we must have some consideration for the past. Names with which all general zoologists, anatomists, and physiologists are familiar should be respected, should be excepted from the rule in virtue of what may be termed the privilege of prescription. If biologists would agree to make that one exception to the law of priority in nomenclature, things would adjust themselves well enough, and we might hope to see realized some day what we all desire, fixity in names, that we may readily understand the meaning of all writers, not only over the whole civilized world, at the present day and in the future, but back into the past century which has marked so great an advance in zoological science. Such a result would be attained by protecting time-honoured names of well-known animals from the attacks of the revisers of nomenclature. For this purpose future committees that may be convened to discuss these topics might confer a real and lasting benefit on zoology by determining, group by group, which names are entitled to respect, not, of course, on the ground of their earliest date or their correct application in the past, but as having been universally used in a definite sense. This suggestion is not a new one. As far back as 1896, in a discussion which took place at the Zoological Society of London, Sir Ray Lankester, protesting against the digging up of old names, suggested that an international committee should be formed, not to draw up a code of rules but "to produce an authoritative list of names—once and for all—about which no lawyer-like haggling should hereafter be permitted." Twelve years have elapsed, and nothing of the kind has been arranged. On the contrary, the various committees that have legislated since have insisted on absolute priority, and we often read that such a decision has been arrived at by international agreement. It is not so; a great body of zoologists in this country protest and hope that something will be done towards carrying out the proposal here briefly set forth, which seems to be the only proper step to take in order to prevent the confusion with which we are menaced.

"An Inquiry into the Feeding Habits of British Birds" was the subject of a paper by Mr. C. Gordon Hewitt. It is becoming increasingly difficult, with the introduction of scientific methods into agriculture, horticulture, and forestry, for zoologists studying economic problems to form a definite opinion with regard to the economic status of many species of the birds of our islands, such as, for example, the Rook, Jay, Starling, Chaffinch and other finches, and many other birds. This difficulty is entirely due to the almost complete absence in this country of any precise information as to the food habits of our

birds. There exists a large amount of evidence obtained from observers, such as fruit-growers, gamekeepers, sportsmen, and others; and, although some of this may be and is useful, much of it has been distorted on its way through the prejudiced glasses of the observer. What is really necessary in order to obtain as accurate a conception as possible of the economic status of any species of bird is the actual dissection and recording of the contents of the crops and stomachs of a large number of individuals killed, not only in different months of the year but also in different localities, since different conditions exist in different regions, for example, in Kent and Lancashire. Such evidence is the only real and safe guide, and observational evidence, after careful selection, must only be taken as supplementary. Very little work of this nature has been accomplished in this country, but until it is done the regulations with regard to the protection of birds will be ever subject to the influence of the personal bias and ignorance of the legislators, and such legislation will be on as equally a sound foundation as many of the fisheries regulations were until the advent of scientific fishery investigations. The Biological Survey Bureau of the United States Department of Agriculture furnishes an excellent example of the kind of work that should be carried out; it is collecting and publishing a valuable mass of information concerning the feeding habits of birds and their nestlings, from which, in the majority of cases, they are able to deduce the precise economic value of these birds. The Central Bureau for Ornithology of the Hungarian Department of Agriculture is doing similar work. It is proposed to form a British Economic Ornithological Committee, as such work can be best carried out by a number of biologists working together. At the last annual meeting of the Association of Economic Biologists, held in April, 1908, the author moved the following resolution, which was carried unanimously:—"That this Association, recognizing the great need of an organized inquiry into the feeding habits of the birds of the British Isles, with a view to obtaining a precise knowledge of their economic status, is of the opinion that a committee should be formed with the object of carrying on investigations on this subject." The Board of Agriculture, recognizing the importance of the subject, have promised to help the inquiry.

Mr. L. Doncaster discussed "Recent Work on Determination of Sex." Until rather recent years there was the utmost diversity of opinion as to the determination of sex. Some regarded it as depending on nutrition, others on the age of the parents or maturity of the germ-cells, some as depending wholly on the egg, and others, again, on the spermatozoon. Gradually, however, a certain amount of order has emerged from this chaos. In the first place, the facts of parthenogenesis made it clear that in many cases at least the sex was determined irrevocably in the egg before segmentation; and the same thing was shown by such instances as *Dinophilus* and certain Mites, in which the eggs which will yield females are larger than those producing males, although both need fertilisation. The bee and those animals which behave similarly, on the other hand, indicate that sex may be modified by the spermatozoon, for in them virgin eggs yield males, fertilized eggs females; but here, again, no treatment after

fertilisation will turn a female into a male or the reverse. It may therefore be regarded as established in very many cases that from the moment of fertilisation at least, and sometimes in the unfertilised egg, the sex is irrevocably determined. The problem had reached this stage when M'Clung, Wilson, and others discovered that in certain insects the males and females contain different numbers of chromosomes in the germ-cells before maturation, the females having an even number and the males one less. After maturation there are two kinds of spermatozoa, one containing the same number as the mature egg, and the other having one chromosome missing. It was at first suggested that at fertilisation the spermatozoon having the larger number caused the egg to develop into a female, that with the smaller number male; but Wilson's later suggestion is that there is selective fertilisation, that the eggs are either male or female, and that male eggs are fertilised by spermatozoa having no heterochromosome, female eggs by those which have it. Morgan has recently found that in a species of *Phylloxera* there are two kinds of spermatids, one of which has one chromosome more than the other. Those with the smaller number degenerate; those with the larger develop into functional spermatozoa, and all fertilised eggs become females. Recently important evidence has been obtained from breeding experiments with Lepidoptera, fowls, &c. In the moth *Abraxas grossulariata* there is a rare variety, *lacticolor*, which is found usually only in the female. It is a Mendelian recessive, so that when paired with a typical male all the offspring are typical *grossulariata*.

"Experiments in Inheritance."—Interim Report of the Committee, consisting of Prof. W. A. Herdman (Chairman), Mr. Douglas Laurie (Secretary), Mr. R. C. Punnett, and Dr. H. W. Marrett Tims. (Drawn up by the Secretary.)

On the Inheritance of Yellow Coat Colour in Mice.—Reasons for this Research.—The primary reason for this research is the unexpected result obtained by Cuénot on cross-breeding yellow mice with mice of other colours. On mating a yellow mouse with one that was grey, black, or chocolate, Cuénot always found yellowness to act as a heterozygous Mendelian dominant to the other colour. When yellow F hybrids so produced were intercrossed they gave an F generation much in accord with expectation, being composed roughly of three yellows to one recessive. It is the gametic constitution of these extracted yellows which gives cause for surprise, and which is the essential point of importance. Eighty-one of them were tested by breeding, and it was to be expected that of these twenty-seven or so would be homozygous for yellowness, but not even one fulfilled the conditions of Mendelian purity. "Or, à mon grand étonnement," says Cuénot, "je n'en ai pas trouvé une seule; les quatre-vingt-un souris étaient toutes également hétérozygotes."

This important and interesting result has attracted explainers of different schools. Morgan makes it a text for emphasizing his views about "Contamination." Purity, in the Mendelian sense, he denies. "Purity," he says, "is dominance over latency." Cuénot, on the other hand, supported by Wilson and favoured by Lock, suggests that pure yellow-bearing germ-cells of both kinds are indeed formed

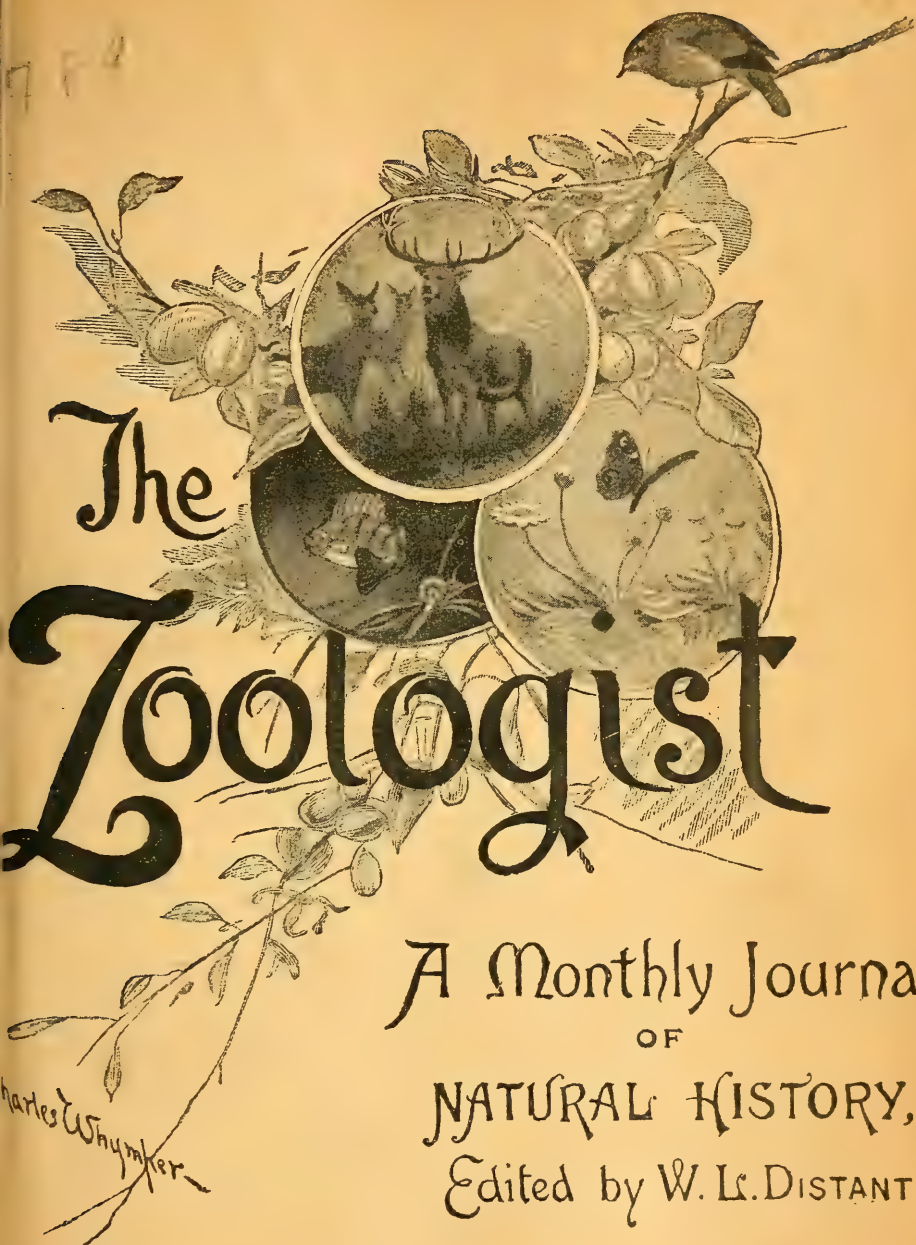
by heterozygous yellow mice, but that there is a selective fertilisation; so that a yellow-bearing ovum and a yellow-bearing sperm are either mutually repellent or mutually sterile, though capable of fertile union with germ-cells bearing other colours. Or it may be that yellow is due to the association of several factors, as appears to be the case in certain colours of sweet peas investigated by Bateson, Saunders, and Punnett, and reported on by them to the Royal Society. Castle, discussing various alternatives, commits himself to none. Further experiments are evidently most desirable.

"Index Generum et Specierum Animalium," Report of the Committee, consisting of Dr. Henry Woodward (Chairman), Dr. F. A. Bather (Secretary), Dr. P. L. Sclater, Rev. T. R. R. Stebbing, Dr. W. E. Hoyle, Hon. Walter Rothschild, and Lord Walsingham. Steady progress has been made with the indexing of the literature for the second portion of this Index (1801-1850). Among numerous works dealt with, the compiler, Mr. C. Davies Sherborn, specially mentions the following:—Boisduval's works on Lepidoptera; publications of the Bologna Academy; Bonaparte's numerous tracts and his 'Conspectus Generum Avium'; publications of the Bonn Natural History Society; publications of the Bordeaux Linnean Society; Roret's edition of the 'Suites à Buffon.' The number of index-slips increases with great rapidity, and continual effort is needed to keep this mass of material in order for reference. The slips already arranged constitute a mine of information for monographers and others. They are preserved in the Geological Department of the British Museum (Natural History), where reference is frequently made to them by members of the staff and outside workers, while information derived from them is often asked for by correspondents at a distance. The Committee would, however, be glad to see still more advantage taken of the facilities now offered for the consultation of this valuable aid to systematic work.

Prof. George H. Carpenter contributed a paper on "Some Arctic and Antarctic Collembola." The last ten years have been marked by great advances in the systematic study of the Collembola, or Spring-tails. Collections from many parts of the world have been worked out, but the most striking results have been obtained from the examination of specimens brought from the Arctic and Antarctic regions by various expeditions. The comparative richness of the Collembolan fauna of remote northern and southern lands is remarkable. In the Arctic, Greenland has about twenty species of Spring-tails, Spitzbergen sixteen, and Franz-Joseph Land seven; while in the Antarctic, Kerguelen has five, Graham Land and the South Shetlands four, South Georgia six, the Falklands ten, and South Victoria Land at least two. According to the views of most recent students, the *Poduridæ* and the *Isotominæ* are nearest to the primitive stock of the order, the *Entomobryinæ*, the *Tomocerinæ*, and the *Symphyleona* being more highly specialized. It is suggestive to find that in both the Arctic and Antarctic faunas the primitive sections are well represented, while the specialized genera have but very few species. And in the more remote and insular regions the higher groups seem entirely absent. Of much interest is the presence of two Arctic

Isotomines in our own islands. These are *Agrenia bidenticulata* (Tullb.), a species both Arctic and Alpine, discovered last year in Irish and North British mountain streams, and *Proisotoma Beselsii* (Packard), which inhabits the Arctic Regions of both the Old and New Worlds and the coast of Scotland. "Bi-polarity" in the Collembola is shown by Wahlgren's recent record of this latter species from Terra del Fuego and by the presence of a closely allied form (*Proisotoma Brucei*, Carp.) on the South Orkneys. Such distribution indicates a high antiquity (probably Mesozoic) for the species. A similar conclusion is suggested by a comparison of the distinctively Antarctic Springtails. Several genera are apparently confined to the southern regions. Among these *Cryptopygus* (Willem) is represented by identical or nearly allied species in Terra del Fuego, Graham Land, South Shetland, South Orkneys, and South Georgia. Turning to genera of wider range we find the same *Isotoma* (*I. octo-oculata*, Willem) present in Graham Land, South Shetland, South Orkneys, and Kerguelen, while the *Isotoma* of South Victoria Land (*I. klovstadi*, Carp.) is closely allied to a Fuegian species. Such distributional facts suggest a considerable geological age for the species and a former wide extension of the Antarctic Continent. The National Antarctic 'Discovery' Expedition collected from moss at Granite Harbour, South Victoria Land, a remarkable Springtail, referable to the *Poduridæ*, but showing some striking affinities to the *Isotominæ*. This insect—apparently the most southerly terrestrial animal yet known—will be described and figured in the forthcoming part of the Expedition Reports.

"The Migratory Movements of certain Shore-Birds as observed on the Dublin Coast" were described by Mr. C. J. Patten. "While the majority of my observations, extending over twenty years, on the migratory movements of shore-birds along the Dublin coast have been incorporated in my work entitled 'The Aquatic Birds of Great Britain and Ireland,' published at the end of the year 1906, I still continue to visit my former hunting-grounds, and, with the aid of trustworthy correspondents, have collected further information on the subject. To add to my personal observations and to enable me to bring before the meeting of the British Association information as recent as possible, I selected the Dublin coast this autumn as a sea-side resort. I would refer particularly to the Sanderling (*Calidris arenaria*). There is now strong evidence to show that this bird is found in adult plumage throughout the breeding-season on that coast. The observations of Mr. A. Williams, made in July, 1906, in this locality, on the Sanderling are of interest, as there was an unusually large gathering of adult birds recorded. In many ways the Turnstone repeats the migratory movements of the Sanderling, and is found throughout the year on the Dublin coast in adult plumage. I have, moreover, dissected the genitals of the female bird, shot at the height of the breeding-season, and have found quite ripe ova. The time will, I believe, yet come when this species will be discovered breeding on the Irish sea-board, or perhaps along the shores of inland lakes."



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COMMON TERN WITH CHICK AND EGG.

THE ZOOLOGIST

No. 808.—October, 1908.

A VISIT TO THE TERNERY AT WELLS-BY-THE-SEA.

BY FRANCIS HEATHERLEY, F.R.C.S.

(PLATES II. & III.)

ON our arrival on June 14th both Common and Lesser Terns were beginning to hatch out. There were two distinct colonies of Lesser Terns—one in the shingle just above high-water mark, at a place called the East Point, by the side of an almost silted-up creek, and another about three hundred yards to the west on an old beach inland of the sandhills. According to Pat Cringle, who has succeeded his father as bird-watcher, and whom we found an intelligent and observant guide, there were about thirty nests in each colony.

The Common Terns' nests were scattered along about a mile and a half of the shore, most of them being amongst the marram-grass. When the first eggs were laid Cringle counted nine hundred eggs, and he estimated the total number of nests at the time of our visit at over one thousand.

The Common Terns' eggs laid amongst grass had a nest of grass; those laid among the pebbles often had a collection of broken cockle-shells, but this was not as markedly the case as with the Lesser Terns. Those laid in sand had nothing round them, and were the most difficult of all to see.

The most peculiar nest we saw was one on an old mud-flat about two feet from a large patch of purplish-brown moss. The

three eggs were surrounded by a band about four inches wide, made up of a mosaic of irregular pieces of moss placed side by side and right side up. Close to this nest Mr. Frank Southgate and I found a nest of the Common Tern containing a chick and egg overrun with ants. The chick was quite sore about its back, and kept wincing and shaking itself under their attack. After freeing them from ants we moved them to a spot about thirty feet away, which seemed free from these insects, obliterating the old nest made of grass and making a new one. We then retired to the neighbouring sandhills, and whilst having our lunch watched events through our field-glasses. The old bird pitched momentarily four times at the old site, the fifth time about ten feet from the new nest, and the sixth time quite close to it, and then went on to it. On inspecting the nest afterwards we found it again overrun with ants.

Some of the Common Terns held their wings up almost perpendicularly for quite a second before folding them; some did this much more than others. In folding their wings there seemed no rule which should lie uppermost. In the same bird, at an interval of only a few minutes, the order was changed.

During two days of our fortnight's stay there was a strong and cold north wind, accompanied by widespread mortality amongst the chicks. Cringle pointed out that it is not the cold which is so fatal as the wind, which, by making ripples on the water, prevents the old birds from being able to see to fish. I took a good many photographs of the young being fed, and was surprised to find how seldom this takes place even in fine weather; hardly ever were the intervals shorter than half an hour. The approach of the male with a fish was heralded by the female looking up and screaming. Although I could not detect any difference in the notes, the young were better informed, for they immediately scrambled out from under their mother, waving their wing-stumps frantically, and with widely open mouths calling "cheer, cheer." Then the male would alight with a whitebait or sand-eel held crosswise in his beak, and it was in a flash transferred to the nearest chick, who swallowed it head first and retired under his mother. Occasionally there would be a long wait after the heralding cry, due to the male with the fish being pursued by other Terns. Sometimes the male had no fish when

he alighted, but put his beak into the chick's mouth and apparently gave it liquid food. I never saw the old bird eject food on to the ground for the young to peck at, as does the Black-headed Gull.

On one occasion the male brought a fish like a big minnow, which was as long as, if not longer than, the chick. The chick got it half-way down, and there it stuck. The male who was watching gave the protruding part of the fish a nip, but it was no use, and the chick, dropping it, the male flew away with it, but returned in a few seconds, when another chick had a try with the same result. This time the old bird, after picking it up and flying away, returned, but the fish was not visible. The chick looked very comical staggering about, but unfortunately for me the incident took place during a sunless interval. We several times came across small fishes and shrimps which had apparently been dropped during scrimmages, and we tried to get the chicks to swallow them, but failed. Once or twice the female got off her eggs when the male came down and walked about a little, as if to stretch her legs.

The following day, as this bird had hatched out all her three eggs and therefore might not always be in the same place, my partner, Mr. Earl, thought it would give me a better chance if there were two nests in the field of view; so he transferred another Tern's chick and egg to a spot about three feet from the other. The plan did not answer, because the new birds did not claim their offspring. What did happen was that after about the second visit our bird saw the egg, and it proved a great attraction—half the times she alighted at the new site instead of the old, and sat on the egg. One photograph I took shows her sitting on the new nest with her wings very much spread out, as she was covering four chicks and an egg at the time; she certainly made no difference between the strange chick and her own.

Although the Lesser Tern, owing to its stupidity or superior boldness, should have yielded the best photographic results, we in the end only had very poor photographs, because after the first few exposures we went on to something more difficult. When we came back to them after dealing with the other birds we encountered a difficulty we had not met with previously. The local barber had amused Mr. Earl by affirming that Terns did not sit

on their eggs, but let the sun hatch them out. We found there was more truth in the theory than was at all pleasant. We had a succession of blazing hot days, and however carefully we concealed the camera, its presence near the nest seemed quite enough to decide the bird to let the sun do its work; this was notwithstanding the fact that they had all reached the last stages of incubation, when most birds sit closely.

The two species probably nest in separate colonies because they do not agree together. On one occasion I had an instance of this whilst trying to photograph the Lesser Tern. A Common Tern alighted about ten feet to seaward of the nest, and stood there calling. Then it was joined by its mate, which settled down as if on eggs. Presently the standing bird waddled up to my Lesser Tern's nest which contained a dead and a live chick, and, standing over them, shouted to the Terns overhead. Then it picked up one of the chicks—I thought it was the dead one—and dropped it; then it picked it up again and walked two or three feet away, and dropped it again. This time I could see it was the live chick struggling on its back. Then it picked it up, and, flying into the air, pitched about fifteen yards to seaward. I was so enraged at seeing my last chance of photographing the Lesser Tern destroyed that, instead of photographing this unique incident, I pursued the marauder, and after a little search found the chick uninjured, and the spot where the Common Tern had been sitting hollowed out as if she had been about to lay. The Lesser Terns did not come down to their nest, nor did they show any fight during the raid.

Two years ago I saw a good deal of the Arctic Tern in the Hebrides, and, after watching the Common Tern for a fortnight, have come to the conclusion that it is possible to distinguish them when flying. The Common Tern has a much less jerky flight than the Arctic, and hovers in fishing a great deal more than does the Arctic; in fact, it more nearly approaches the Kestrel than any other bird I have yet watched in this respect. A third distinction which Cringle pointed out but which I cannot confirm, owing to not remembering how the Arctic Terns carry their tails, is that the Arctic Tern more often carries its tail closed than does the Common. This, I presume, accords with their different styles of flight, as I have noticed in calm



MALE AND FEMALE RINGED PLOVER AT NEST.

weather that the Swifts near the ground have their tails well spread, whereas those flying high with less steering to do carry them closed.

The Terns seemed very sensitive to changes in temperature; one I was working at sat gaping and panting in the morning when it was hot and sultry, and shivering in the afternoon when it grew overcast and a wind sprang up from the north.

Since leaving on June 24th I have heard from Cringle that a great many of the young birds died during subsequent rough weather, and that during some exceptionally high tides so much of the Point was flooded that had they occurred during the breeding season quite five hundred of the Common Terns' nests would have been flooded, and I presume one of the Lesser Tern colonies would have been destroyed. He also mentions finding a nest of the Common Tern with two eggs in it on Aug. 17th.

We found the Ringed Plover more intelligent than the Terns, making much more fuss about the camera. It certainly is not a timid bird—in fact, its boldness made Mr. Earl call it the “cock robin of the shore.” I found it fairly easy to distinguish the male by its ring being a more intense black. They seemed to relieve one another, in sitting, every half-hour. We came across the feathered skeleton of one bird with the remains of the blunt end of the egg fixed in the pelvis, showing the mode of death.

In the case of many birds, *e.g.* Curlew, Peewit, and Golden Plover, the books say that the young leave the nest as soon as hatched, while I have found that they remain in the nest upwards of sixty hours after hatching; but as regards the Ringed Plover, it seems literally true, the chicks wandering off within half an hour of being hatched to feed on the sandy shore under the paternal eye, leaving their mother to hatch out the remaining eggs. They are much more advanced when hatched than the Terns. All the nests we saw had four eggs, whilst among the Terns this number was exceptional.

Although we examined a good many clutches of Ringed Plover's eggs, I could detect no difference in coloration, whereas the difference in coloration amongst the Tern's eggs was a marked feature. I have noticed this variability amongst other birds that lay their eggs in colonies. It would be interesting to

know whether this is the rule, as in that case it would lend support to the theory that extreme variability is a help to the birds in distinguishing their own eggs.

We found the Ringed Plover very combative. Owing to a number of clutches hatching out simultaneously there was a large increase one morning in the number of chicks on the sand, and there were constant fights going on amongst the old birds for "spheres of influence." The chicks in feeding took quick little runs just like their parents. The old birds did not seem to do any teaching, but just remained in their vicinity.

In fighting, the old birds lowered their heads and raised the feathers of their backs. Occasionally all four would demonstrate in this way. One pair actually fighting seemed to have their beaks interlocked, and one was banging the other down on the sand.

We left Cringle one day to watch if a Lesser Tern returned to her nest, and he reported a fight which ended in one bird returning, soon after the combat had terminated in the vanquished flying away, chasing two of the chicks and killing them one after another, shaking them as a terrier shakes a rat. The Ringed Plovers frequently simulated disablement to lure us from their nests.

There were a good many Redshanks breeding in the marram-grass. Cringle drew our attention to the fact, of which we had no previous knowledge, that the sitting bird twists the grass together overhead as she sits on the eggs. As in the Snipe, the eggs are laid in the middle of a clump, so that the stems form a hiding screen all round, but by twisting the grass into a tangle the eggs are also hidden from above. All the nests we saw contained four eggs lying point to point, and there were two runs, so that the ground plan was like the shape of a hairpin with slightly separated legs, and the eggs at the blunt end. The runs were each about two feet long, and there was a slight gap between the grass-stems both back and front of the eggs. Curiously, the two nests we worked at did not show this twisting of the grass; in one case the grass perhaps was not long enough, but in the other I think it was due to the bird, when disturbed, rising straight into the air instead of stealing away on foot.

The Redshank was the most wary of all our sitters, cautiously approaching her eggs long after the surrounding Common Terns

had settled on their eggs, and being the first to leave. The only nest we found was due to Mr. Earl flushing the bird, but Cringle says he can always find them by looking for tangles in the grass. According to Cringle it is almost impossible to make a Redshank desert its eggs, even after having been struck at with a stick, or having been caught by a dog and losing some of its feathers it will return. With its sylph-like figure, dainty steps, and fluty note, it was the prettiest bird we met with at the ternery.

There were a good many Partridge nests, and Mr. Earl pointed out that the eggs were smaller than of those that frequent arable land.

Whilst with Mr. Southgate I saw three Redshanks perching somewhat uncertainly on the branches of a dead bush. Had our focal plane shutter been in working order we might have got some good photographs of Redshanks flying. In crossing the marsh, if Cringle happened to let his dog wander, it was soon followed by an ever-increasing mob of Redshanks, some of them only two or three feet above the ground; once there were about thirty of them, all evidently suspecting his intentions.

The following notes have been sent me by Pat Cringle, the bird-watcher :—

“The Lesser Tern makes its first appearance here about the last week in April, nearly always two or three days before the Common. The Lesser Tern is the first to lay, but not until two or three days spent in making experiments, each bird making two or three nests before deciding on one. I generally find the first eggs about May 24th, but this year I saw some on May 18th. I find that after laying in the same place for a year or two the whole colony will shift to another place. They do not seem to like the Common Tern at all, and although they are half as small again, they seem to be the masters, as they drive them away if they come near their nests. When they have young they are not so fierce as the Common Tern, but they will make a good deal more row when danger is near. If one is a bit suspicious of anybody being about it seems to have a warning note, for as soon as it utters it the others all rise off their nests at the same instant. As soon as the young can fly they get to an open place where they can see a good way round them, and are fed there by the old birds until they can fly to the edge of

the harbour where they are safer. The old birds then teach them how to fish, flying beside them, and diving and catching fish, which they take to the shore, followed by the young, to whom they give the fish when they alight.

“The Lesser Tern’s style of fishing is quite different from the Common Tern’s. It flies very much quicker, and keeps on chirping till it catches a fish, with which it flies up into the air. After swallowing the fish the Tern flies a good way very quickly before looking for any more.

“The Common Tern is generally a day or two later in laying, but the majority begin laying simultaneously. The eggs vary in colour and size. I have seen eggs nearly white and others almost all brown, and some no bigger than Thrushes’ eggs.

“When hatching they are very fierce, and allow no birds to come near the ternery except those that lay with them. I have seen one get off its nest and chase a young Lark that could hardly fly, and kill it on the spot. They are also great enemies of the Partridges. In one season I have picked up as many as eight that had been mobbed and pecked to death. When attacked by Terns a Partridge crouches on the ground; the Terns collect from all around and make awful darts at it, diving straight down, and then hovering over it like hawks. The Partridge is often too frightened to fly away, and then at last one of the Terns gets in a fatal blow. They drive holes into the Partridge’s head as if done with a nail. They take their young away like the Lesser and teach them to fish, and when preparing to migrate they all collect in a bunch a mile or two away near the sea for a day or two before they finally go, in the last week of August or first week of September.

“The Redshanks remain here all the year round, as the marshes are full of creeks and mud-flats, from which they can get food during the hard weather. If the weather is open pairing begins about the first week in March, but the majority of birds do not begin to lay until the latter end of April, although I met with eggs on the first of the month. When walking through the nesting-ground some fly quite close, shrieking, while others—the males, I think—soar very high up, like a Meadow-Pipit, and sing a peculiar song. The birds make several nests before laying, but when one has chosen the place she lays four eggs on

the bare sand, and then makes the nest of dried grass afterwards. The male seems to keep watch at a considerable distance from the nest. Their behaviour when sitting varies, some sitting very close, whilst others are shy. One bird whose nest I frequently passed this year would allow me to touch her back as she sat on the eggs, and I have before now accidentally trodden on a Redshank sitting on her eggs. Sometimes the young leave the nest as they are hatched out, but this is not always the case, as I have found them in the nest the day after they were hatched. As a rule the old birds take them to the little creeks to feed, where they find small worms, sand-hoppers, and insects. When they are a day or two old they can already run very quickly on their long legs and hide, so that it would take hours to find them, although you saw within a little where they went into the weeds.

“The Ringed Plover is not nearly so shy as the Redshank. Pairing begins early in April, when the males can be seen fighting for the possession of the females. They fight very fiercely, rushing at each other with their beaks down and feathers bristling up. Sometimes four or five birds will be mixed up in one fight. They generally begin to lay in the last week in April. The nest is nearly always lined with small stones, but sometimes, when under the grass, it is a mere hollow in the sand. They often lure you away from the young when recently hatched, opening their tails and drawing them along like fans, or tumbling and scuffling along with one wing up and the other down, as if wounded. They do not forget to go the opposite way to that the young are running. Very often you can see hundreds of chicks running about on the edge of the sands, waiting for the tide to go out. Old and young keep together until August. In winter the Ringed Plovers form flocks, and frequent one place all the time if not shot at.”

THE PRICES OF ANIMALS.

BY GRAHAM RENSHAW, M.B., F.Z.S.

THE following list of prices of living zoological specimens may be of service as a supplement to Capt. Flower's most interesting article on this subject ('Zoologist,' *ante*, p. 281). Most of them have been noted during the last ten years, but a few are taken from very much older records, as will appear.

Class MAMMALIA.

Order PRIMATES.

Family CERCOPITHECIDÆ.

Cercopithecus diana, Diana Monkey.—£2 10s.

Papio mormon, Mandrill.—£30 (Wombwell's auction at Edinburgh, April 9th, 1872).

Family CEBIDÆ.

Mycetes seniculus, Red Howler Monkey, one year old.—£8.

Nyctipithecus vociferans, Douroucouli.—£1 10s.

Family LEMURIDÆ.

Lemur fulvus, Brown Lemur.—£1.

L. catta, Ring-tailed Lemur.—£1 10s.

L. varius, Ruffed Lemur.—£4.

Galago garnetti, Garnett's Galago.—£2 10s.

Loris gracilis, Slender Loris.—£1 5s.

Perodicticus potto, Bosman's Potto.—£1 10s.

Order INSECTIVORA.

Erinaceus algirus, Algerian Hedgehog.—10s.

Order CARNIVORA.

Family FELIDÆ.

Felis uncia, Snow Leopard.—£200.

F. nebulosa, Clouded Tiger.—£30.

F. temmincki, Golden Cat.—£3. The determination of the species seems, however, open to doubt.

F. serval, Serval Cat.—£5.

F. caracal, Caracal Lynx.—£8.

F. concolor, Puma.—£20.

F. onca, Jaguar.—£40 (an old specimen).

F. tigrina, Margay.—£1 10s. (six months' kitten).

Family VIVERRIDÆ.

Viverra civetta, African Civet.—£5.

Genetta senegalensis, Senegal Genet.—£1 10s.

Poiana poënsis, African Linsang.—£3.

Arctictis binturong, Binturong.—£8.

Crossarchus obscurus, Kusimanse.—£1 10s.

Family HYÆNIDÆ.

Hyæna striata, Striped Hyæna.—£8 (young).

Family CANIDÆ.

Canis zerda, Fennec Fox.—£1 10s.

Lycaon pictus, Cape Hunting Dog.—£20.

Family PROCYONIDÆ.

Cercoleptes caudivolvulus, Kinkajou.—£1 10s. to £4.

Bassaris astuta, Cacomistle.—£45 (pair).

Family PHOCIDÆ.

Phoca vitulina, Common Seal.—£5.

Order RODENTIA.

Family SCIURIDÆ.

Sciurus maximus, Malabar Squirrel.—£1 10s. to £2.

S. prevosti, Prévost's Squirrel.—£1 to £1 10s.

Xerus getulus, Getulian Ground Squirrel.—12s. 6d.

Cynomys ludovicianus, Prairie Dog.—£1 5s.

Family DIPODIDÆ.

Dipus jaculus, Egyptian Jerboa.—5s. to 10s.

Pedetes caffer, Cape Leaping Hare.—£5.

Family MURIDÆ.

Platacanthomys lasiurus, Malabar Spiny Mouse, 12s. 6d.

Hydromys chrysogaster, Australian Water Rat.—£1 5s.

Family OCTODONTIDÆ.

Myopotamus coypus, Coypu Rat, £2 to £2 10s.

Family HYSTRICIDÆ.

Atherura africana, West African Brush-tailed Porcupine.—£2 10s.

Family CHINCHILLIDÆ.

Lagostomus trichodactylus, Vizcacha.—£1 10s.

Family DASYPROCTIDÆ.

Dasyprocta cristata, Golden Agouti.—£1 5s.

Order UNGULATA.

Suborder PERISSODACTYLA.

Equus burchelli, Burchell's Zebra.—£80 for newly imported specimens. I once saw one in a list offered at £10!!

Suborder ARTIODACTYLA.

Family BOVIDÆ.

Ovibos moschatus, Musk Ox.—£50 to £65. All these were newly imported calves.

Damaliscus albifrons, Blesbok.—£25 (in 1871).

Connochætes taurinus, Brindled Gnu.—£80 (young).

Gazella bennetti, Indian Gazelle.—£6.

G. dorcas, Dorcas Gazelle.—£6.

Oryx leucoryx, Leucoryx.—£50 (given by Lord Derby in 1837).

Addax nasomaculatus.—£114 (given by Lord Derby about 1840 for a pair of Addax, together with a male Leucoryx).

Family GIRAFFIDÆ.

Giraffa camelopardalis, Northern Giraffe.—£1800 (given by Wombwell for his first pair of Giraffes—an enormous price. They died before their special exhibition cage could be finished. He soon after bought four more for £2000, but all died in four months!)

Order EDENTATA.

Family DASYPODIDÆ.

Dasypus villosus, Hairy Armadillo.—£1 10s. to £2.

D. sexcinctus, Six-banded Armadillo.—£2.

Cycloturus didactylus, Two-toed Anteater.—£3 (price paid by the Zoological Society in 1854).

Orycteropus capensis, Cape Aard Vark.—£150 (in 1869).

Order MARSUPIALIA.

Family MACROPODIDÆ.

Macropus robustus, Wallaroo Kangaroo.—£20.

M. bennetti, Bennett's Wallaby.—£5.

Family PHALANGERIDÆ.

Petaurus breviceps, Short-headed Phalanger.—£3 (pair).

Family DASYURIDÆ.

Sarcophilus ursinus, Tasmanian Devil.—£3 5s. (Wombwell's auction sale).

Class AVES.

Order PASSERES.

Urocissa occipitalis, Himalayan Blue Pie.—£2 10s.

Paradisea minor, Lesser Bird of Paradise.—£30 (male).

Sericulus melinus, Regent Bird.—£6.

Lamprotornis caudatus, Long-tailed Glossy Starling.—£1 15s. to £2.

Lamprocolius chalybeus, Green Glossy Starling.—£1.

Oriolus kundoo, Sykes's Oriole.—£1 10s.

Garrulax sinensis, Chinese Jay Thrush.—£1 10s.

Order PICARIÆ.

Colius striatus, Striated Mouse-bird.—£1 10s.

Buceros rhinoceros, Rhinoceros Hornbill.—£20.

Dichoceros bicornis, Concave-casqued Hornbill.—£16 asked for a young pair.

Sphagolobus atratus, Black Hornbill.—£3 to £4. I once knew a fine healthy specimen change hands at £1 10s.!

Guira sp.?, Guira Cuckoo.—£1 10s.

Eudynamis honorata, Koel Cuckoo.—£1 10s.

Order PSITTACI.

Trichoglossus forsteni, Forsten's Lorikeet.—16s.

Order STRIGES.

Syrnium torquatum, Collared Owl.—£3 10s.

Carine noctua, Little Owl.—5s.

Order ACCIPITRES.

Serpentarius secretarius, Secretary Bird.—£15.

Sarcorhamphus gryphus, Condor.—£15 (this was a veteran forty years old, which changed hands at the sale of Wombwell's No. 1 menagerie at Edinburgh in April, 1872).

Order STEGANOPODES.

Ibis æthiopica, Sacred Ibis.—£1 10s.

Tigriosoma lineatum, Tiger Bittern.—£3 5s. (or £3 10s.) for an immature pair.

Order COLUMBÆ.

Æna capensis, Cape Long-tailed Dove.—12s. 6d. "pair." As a rule this means a couple of male birds, the hens being seldom imported.

Goura coronata, Common Crowned Pigeon.—£6 per pair.

G. victoria, Queen Victoria's Crowned Pigeon.—£30 per pair.

Chalcophaps indica, Green-winged Pigeon.—£1 10s. per pair.

Calenas nicobarica, Nicobar Pigeon.—£1 5s. asked for a single (acclimatized) bird.

Numida vulturina, Vulturine Guinea-fowl.—£8 per pair.

Order FULICARIÆ.

Porphyrio porphyrio, Violet Gallinule.—£1 5s. each.

Tribonyx mortieri, Mortier's Waterhen.—£1 5s. each.

Order ALECTORIDES.

Cariama cristata, Common Seriema.—£2 10s. each (once).

Grus virgo, Demoiselle Crane.—£4 10s. per pair.

G. antigone, Sarus Crane.—£25 per pair.

Order IMPENNES.

Spheniscus demersus, Jackass Penguin.—£2 each.

Order CRYPTURI.

Rhynchotus rufescens, Giant Tinamu.—£1 5s. each.

Class REPTILIA.

Boa constrictor, Common Boa.—£75 was given by Wombwell for his first pair of these reptiles. Youngsters can be purchased at 10s. each; "good-sized" examples for about £2.

Vipera arietans, Puff Adder.—£2 10s.

Crocodilus americanus, Sharp-nosed Crocodile.—£1 (for a foot-long specimen).

Chrysemys concinna, Terrapin.—6s. (young).

Cachuga tectum, Black and Yellow Batagur.—2s. 6d.

Testudo tabulata, Brazilian Tortoise.—15s. to £1.

Class AMPHIBIA.

Bufo melanostictus, Indian Toad.—5s.

B. mauritanicus, Moorish Toad.—10s. (asked).

Xenopus lævis, "Plathander" or Smooth-clawed Frog.—3s.

Proteus anguinus, Olm.—5s.

Class PISCES.

Ceratodus forsteri, Australian Lung Fish.—£50.

THE VOCAL AND INSTRUMENTAL MUSIC OF INSECTS.

By A. H. SWINTON.

My earliest interest in the music of the Cicadas was awakened by the Greek Anthology, whose odes transport the reader to the Grecian colonies, and inspire a wish to hear their convivial melody; I have listened to Arab and Spanish workmen rattle off such ditties after sipping at the wine-bag, when the sun grew hot, regardless of epigram and prosody. Why the autochthons of the old territory of Locris made so merry while those of Reggio continued glum remained a mystery until I reverted to the hypothesis that the southern shore of the Italian toe received the sunlight early when the eastern crags of Reggio slept in gloom.

One day I left the folios of the British Museum Reading Room and looked in on the late obliging Frederick Smith, in order to see the objects that so enchanted the Grecian musicians, one of whom, it is said, gained the prize for Eunomus when his harp-string snapped; and certainly the designs of the dessicated vocalists were curiously interesting, but I felt the cold shudder of a frequenter of music-halls who beholds harps, violins, drums, and fifes piled up on a music-stand. What I learnt was that each Cicada carried two ribbed kettledrums slung away at either side, and beneath its body there were two corresponding membranes like battledores concealed by variously fashioned flaps.

Summer came, with its rambles, and on the 2nd of June, 1871, I found myself sitting at a deal table in a New Forest inn, where Mr. Capper, of Liverpool, and an invalid gentleman of the name of Owen, who had driven through the Forest with an intelligent lad, were setting a very complete assortment of local butterflies and moths, and among their treasures I espied a specimen of the little *Cicadetta montana*, which they told me they had just beaten from a hawthorn-bush. Richard Weaver, in 'Loudon's

Magazine of Natural History' for 1832, where he calls it *hæmatodes*, has informed collectors of the ferny groves it haunted, and here some enthusiasts have heard a male practising a dithyrambic; but I went out and shook the milk-white blossoms in vain. Returning to my books, I learnt that the late Prof. Carus, having a kindred desire to hear a Cicada sing, and failing to do so in Germany, decided to travel south to Italy. Consequently, in the spring of 1878, I enlisted the sympathies of an elderly relative who retained reminiscences of the grand tour, and induced her, with reluctance, to revisit the classic fields; indeed, when we went past Avignon and came in sight of the grey olives, I heard her exclaim that she "never wished to see them again." However, we arrived safe at Verona in the pleasant month of May, and having duteously visited the amphitheatre and supposed tomb of Juliet, I found myself at liberty to walk in the meadows where the field-cricket were chirping and the Adige runs swift and deep. Here I discovered the cockchafer-like grub of a Cicada that had come out of the ground to enjoy the balmy air. I was then hurried south on a circular tour to the island of Capri, where the hotel waiter assured me the Cicadas would not sing before the middle of June, that they were in full-voiced choir in August, and that when the cold breath of autumn came the ground was covered with their dead bodies. Then, after a prolonged stay at Anacapri, in view of Vesuvius, continually smoking or steaming, with no idea of an eruption, my lady relative commenced to entertain fears of encountering the summer heat, so we returned post-haste to Turin, where she left me to my meditations.

Anxious to hear the Cicada band, I forthwith secured a room—they called it a stanza—near the hostelry of Madonna del Pilone, which a Piedmontese woman, who spoke a little intelligible Italian, came daily to sweep out with a laconic greeting of "Bon serai." The morning after my arrival I took a stroll along the shady avenue that runs beside the smooth flowing River Po, where *Cicada orni* was already chirping among the bushes; and on the 16th of June I surprised a coterie collected among the poplars and acacias that overhung the smooth flowing river, occupied in singing overtures, *con amore*, to the harsh "kroax! kroax!" of the green frogs, raising their voices in a

dirl and a whistle that resembled the din of a grinder's wheel or of a watch running down—that commenced briskly, and in a quarter of a minute subsided. So contentious were they that one I captured continued to vociferate in my hand, raising its abdomen as it did so, and quivering, twitching, and dimpling its kettledrums, whose beautiful shell-like structure is exposed to view. Soon afterwards I noticed another Cicada whistling an air on a young and graceful poplar, and vibrating its wings with new delight. “Volete farmi descendere questo insetto,” said I to a fisherman who was passing by with a rod. “La cicala,” he replied, aiming a blow with good intentions, and ejaculating, as it darted off with a piteous cry, “seuro.” Proceeding further I beheld another, and now I ventured to shake the tree to dislodge it, but it only clung on the faster and screamed the louder; a third that I caused to take flight was unexpectedly seized by a bird as it flew, and disappeared down its throat with a mournful cry of “whee-whee!” Searching among the acacias I discovered what looked like shot-holes in the ground, and near at hand were the masks, the skins of the grubs, or nymphs, from which the Cicadas had emerged, still clinging by their empty legs. Later on, in July, the frogs were awake and croaking at six, at seven the birds were in song, the Cicadas were screeching at half-past nine, and then it was pleasant to sit in the shade and listen to the males sing in chorus to the “click-click!” of the water-wheel, where their dizzy din of “derde-derde!” interrupted with a monitory “tip-tip!” resounded, until the heat of noon enforced silence. At five in the afternoon, when the performance was over and silence had resumed its reign in the alcove, I saw a female *orni* wing swiftly to the vines that draped a sunny knoll that had lately been the scene of uproar. When placed in a box covered with gauze the Cicadas snarled like dogs, clung together as if sparring, and startled the gloom of night with snatches of song. “Happy the Cicada lives,” says a Greek epigram, “for they all have voiceless wives.” In July I became aware of the presence of the somewhat larger *Cicada plebeja*, whose kettledrums are covered, and sound as in a musical box. Hearing a noise resembling the sound of escaping steam among the pattering leaves of the aspens, I saw it lift its body for twenty seconds, and there came a ghostly refrain of “whee-

whay!" that might have been the parting sigh of the Sisters of Phaeton. As time went on I captured one of the performers, and examined the expanded membranes concealed by the flaps beneath its body, on whose surface I found two raised horny needles corresponding to the corresponding ones on the similarly placed ears of grasshoppers and moths, to which I discovered with some difficulty that a ganglion was similarly connected. These organs are more conspicuous in the male than in the female Cicada, and before leaving Madonna del Pilone I made some other careful drawings of their structure in *Tettigia orni* and *Tibicina hæmatodes*, as would appear. Some of the Cicadas were cleared off by a small bird which sat on the bushes that grew on the sunny side of a hill, and twittered to provoke a response and discover their whereabouts; their choir in July was augmented by a smaller species that appeared on the scene with a scraping note of "chip-chip!" *Plebeja* ceased to sing on the 26th of July, and then the copper-shaking cries of *Cicada orni* alone resounded from the tall poplars and aspens, until, on the 1st of August, a mournful silence had settled on the shady avenue at the side of the Po. There is a well-known ride from Madonna del Pilone to the summit of the eminence of the Superga, where at times a grand panorama of the Alpine peaks can be enjoyed, but it should be accomplished before sunrise, for during the day they are obscured with haze. The thick-pated shepherd Corydon, with whom the poet Virgil was acquainted, must have lived somewhere on those mountains, where the Cicadas were accustomed to scream among the bay and myrtle scrub.

While sojourning with my relatives at Guildford, in Surrey, I made some drawings of the frescoes in St. Mary's Church, and the carvings on the castle wall. I read the local guide-books; the romantic adventures of the Plantagenet Kings captivated my imagination, and to satisfy my curiosity I took an antiquarian tour in 1884 down Western Europe, until I arrived at the mud-plastered town of Valladolid. On the 27th of June I took a walk in the public gardens, which were full of luxuriant blossoms, but so solitary it seemed a scene of some story such as is told in the 'Arabian Nights.' On arriving at the calm sunny waters of the Pisuerga, where there were pleasure boats and rafts of timber floating, I again heard *Cicada plebeja* per-

forming with harp-like ring, seated aloft on the bordering poplars, and a sun-dazed workman beneath was singing ironically in response "hehehe-ha-ha!" In the afternoon of the 7th of July I strolled out along a shady avenue where ranks of Lombardy poplars rose on either side like church-steeples; it led out, if I recall, from the Convent of San Pablo, and I had not gone far when I arrived at a villa residence beset with mushroom-topped pines. It seemed the abode of eternal silence; its inmates probably had partaken of a hearty dinner and were asleep. They must have had evil dreams, for a deafening racket from the mushroom-topped pines of resinous violins—a croaking, squealing, cork-drawing, and bagpipe dirl, a cockatoo concert—announced that I was present at the nuptial revels of *Tettigia orni*, and I soon found I was at liberty to pick as many of the intoxicated bridegrooms off the sticky trees as I pleased, for they had drunk the spirit of turpentine, which is a poison to man, long and deep. In consequence I again lingered some little time to watch the indiarubber rebound of their kettledrums, and it then appeared that as these were seen to dimple the air escaped convulsively by an open spiracle immediately in front. Resuming my walk and proceeding a little further along the highway, I surprised a tiny Cicada seated on a tree about twelve feet from the ground, and just out of reach of my umbrella-net, that was making a tinkling noise resembling the rattle of a watch-chain. On the 12th of July they were cutting the barley on the sandy plain of Castile.

When I returned to Guildford I found some Cicadas that my sister had captured at the source of the Sutlej awaiting me. There was a brownish one (*Pycna repanda*), which she had found during a September tour in Cashmere in 1881; a brace of the *Pomponia surya*, which populates the tea-plantations of the Kangra Valley during July; and some other larger ones that came from the leafy slopes of the Himalayas—certain with bottle-glass wings and pointed flaps (*Platylomia saturata*) that were performing at Dhramsala; and the leathery-looking males of another kind (*Polyneura ducalis*), which struck up at Dhramsala and Dalhousie during July and August. Ladies residing at Guildford who had passed their lives in India assured me that my Cicadas rattled like an alarm-clock when the northward

sun brought to Murree the sweep of the south-west monsoon and the dripping days of July and August; but I should imagine the chaunt of "Taza-bi-Taza!" is not there so imperative, as many of these Oriental Cicadas possess a tyrant beauty in their suits of brown bestarred with gold and streaked with sunset hues; nor does it follow that because a Cicada is big and clumsy it is necessarily more noisy, for some of those with covered and concealed kettledrums have them inefficiently developed.

In the spring of 1896, Miss Swinton, of Warsash, who long maintained a village school, and in memory of whom a chapel was recently erected, gave me an introduction to a Mr. Joseph, a well-known missionary of German extraction, then residing at Jerusalem, which I had the common wish to see. I then took the train to Brindisi and crossed to Patras. The thick-warbled notes of the Nightingale did not resound from the evergreen oaks in the gardens at Athens, but I have listened to a splendid concert at Toulouse. All I saw of the Ilissus was a gutter in a back street, so-called. The towers and row of windmills that lined the port of Rhodes carried the imagination back some four or five hundred years. At Jaffa there was a talk of Sharks, and I was told that packs of Jackals, to whose tails, lashed together, Samson tied firebrands, came and howled of a winter night. There must have been a fine conflagration, for the fire consumed the shocks, standing corn, vineyards, and olives. As I passed over the plain of Sharon there was a fine glow of common poppies, called "Shaarari," and, coming to Lydda at noon, I saw the mirage creep round it like the inflowing tide, until its ruined church and ilex-bushes seemed to stand on an island, and the camels to come splashing through the water. Jerusalem, the waterless, lies on the top of a long line of hillocky limestone downs that at first sight resemble those you have left behind you at Dorking, in Surrey. No Lion now comes there from the swelling of the Jordan, and it would seem the sporting Crusaders heard the last one roar at Samaria. Once a large grey animal ran ruffling past me on the hills that stand about Jerusalem. I believe it was a Hyæna. Anacreon thought the Cicada a king, and Meleager, reclining beneath the plane-tree of Gadara, found consolation in the notes of one that was making merry on the sap, when the sun in summer leaves the Bermuda grass alone.

green in the herbage, and the flocks of black Goats come over the hills browsing on the sticks and straws. It was at Jerusalem that Tasso places the enchanted grove of Armida, from which streamed red sap, such as exudes from elm or ivy. Mr. Wilson, the missionary, offered to ride with me to some such thicket when I mentioned I had walked to the supposed site of Kirjath-jearim and seen no trees; around Jerusalem the Arab women break them down for firewood. Above the town rise one or two date-palms that do not mature their fruit, as the site is too elevated, and the scattered foliage around is that of olive and mulberries. One day I trudged out to Bethlehem, and when passing by an enclosure I was startled by a dirl and a rattle that had a resemblance to the castanets. Afterwards, about the 9th of June, the small *Cicadatra atra* commenced to din incessantly on the tops of the purple globe thistles in the vineyards at Jerusalem; it varied in colour from black to a reddish ochre spotted with black, and, as the soil was a yellowish-red loam, the latter form would be protected from the pale-coloured Sparrows. Later on in the month the olives, hoary with red-berried mistle-toe, which, Canon Tristram told me, was not found nearer than the South of Spain, resounded to the croaking of *Tettigia orni*, whose notes rattled on until August. What is singular, one of my specimens of *Cicadatra atra* has an extra veinlet on the second ulnar area of the left wing that forms a triangular cell at its extremity. Mr. Distant has told me he has noticed similar instances in *Cicadæ* from all parts of the world, and I have since found a specimen of a gaudily coloured species (*Platypleura octoguttata*) that has an additional cell in the angle of the third and fourth areas, outlined with brown, so as to form a conspicuous wing-spot. On my return from the Holy Land, when passing the west end of Cyprus, a brisk easterly wind that was blowing through the gaps in the hills precipitated cloudlets that stood out like marble statues on the rocky shore, and took the semblance of the Assyrian Venus drawn by Swans; it seems most probable that deities of old were fashioned in cloudland.

The *Tettigia orni* is the Cicada of the pine that inspired the meditations of Lord Byron at Ravenna; the classical Plebeian Cicada is heard to strike its lyre in the Morea of Greece, and the Blood-red Cicada dwells among the vineyards. A French cousin

once brought me a *Tibicina hæmatodes* in a wicker-cage from Toulouse; it was a female and voiceless. Where the vine baskets on the sunny banks at Toulouse, Solier showed experimentally that the music of *hæmatodes* was a "tom-toming" of kettle-drums. The primary distinction in the singing of Cicada is between those which perform with exposed or muffled kettle-drums—that of the cryptotympanic ending in an expiration that has been compared to the rush of a waterfall. Henry Walter Bates says, in the account of his trip up the River Amazon, that in the month of September the howling of Monkeys and screeching of the Parrots was accompanied by the songs of strange Cicadas; one large kind, which was more numerous up the river than at its mouth, perched high on the trees, set up a piercing chirp, which began with the usual harsh jarring tone that became rapidly shriller, and terminated in a long and loud note which resembled the steam-whistle of a locomotive. Half a dozen of these performers made a considerable item in the evening concert.

Foremost of the Fossorial Hymenoptera come the Solitary Ants, clad in prettily banded fur, whose female is apterous. These are met with perambulating sandy places, or, with other strange mimics, are dislodged from the nests of "Bumbles." They pass their lives among sticks and straws, and on the fore edge of the second joint of their hind body there is a protuberance with a file, with which, when seized, they make a soft sand-papery sound, indicating their resentment—a rattlesnake warning, sometimes followed by the infliction of a sharp sting. To these the little wasp-like species of *Crabro*, it is said, are distantly related; but what is singular, the fore wings of the Solitary Ants are veined like those of the "Bumbles," and those of the *Crabros* are widely different. This for the specialist and evolutionist to puzzle over: the male of *Crabro cribrarius*, who shows a kind of gauntlet on his fore legs resembling that of the fussy water-beetles in order to roughly seize its female, has always had the popularity conceded to the highwayman; and now the female of the large-headed, great-brained *C. cephalodes* is ready to ingratiate herself. I found the little hussy disporting on a cowparsnip-head at Totnes towards the end of July, when cowparsnips are in bloom, and placed her in a large glass jar

covered with gauze, which was daily filled with fresh flowers from the garden dusted over with sugar, and then, during the term of her brief life, when the sun shone out enjoyably, she wandered to and fro, and maintained an almost ceaseless bagpipe dirl, accompanied, and perhaps produced, by the three last ventrally shagreened segments of the body, that moved like a cornet-à-piston telescopically in and out, while the wings lay folded on the back, and, seen with a magnifying-glass, showed no indication of movement. Another small *Crabro* with green side bands I found at the same time Mr. Edward Saunders determined as *lituratus*, a species scattered over the central and southern counties, and tolerably plentiful at Bury St. Edmunds; it made no sound. Conjointly, I got word from Kew that a yellow thistle I picked, as suggested by my memoranda, at Sandwich, or failing at Stroud, near Canterbury, in September, 1870, when the Franco-German war caused excitement, was *Cathemus lanatus*, recorded in Dunn's 'Alien Flora of Britain,' p. 107, and said to be at home on waste places in Palestine. On the 21st of September of the same year I captured a newly disclosed male and female of the scarce Thorn Moth (*Eunomos alniaria*) at evening on a street-lamp post at Deal, which, in the days of Frederick Smith, was the happy hunting-ground of the entomologist. Strange instruments compose a brass band, but to imagine that the Sand Wasps are trumpets on beholding their slender forms is difficult. I have a note regarding a hymenopteron—I cannot think what—that when picked up by the wings near London smelt of garlic and the stew-pan, and continued to utter a noise from its spiracles, which became louder when the wings were allowed to vibrate; placed to the ear the sound was shrill, and the vibration of the thoracic muscles was palpable. *Sceliphron spirifex*, which looks as if its black hind body had been stuck on with a straw, I heard making a piping noise in the early autumn at Turin, while it busied itself collecting mud in a puddle, much as a cat hums like a church-organ when blest with a kitten, and at the same time its wings seemed to be in repose. Sometimes two or more were to be seen thus occupied. I next met with this lugubrious creature on the 23rd of July, 1896, in the town drain or gutter known as the Brook Kedron, whose history is that of the Fleet Ditch. Goureau

says that at the end of the autumn of 1836 he saw *Ammophila sabulosa* busy making a hole in the sand on the banks of the Rhone, and at the same time producing a continuous sound resembling that made by *Syricta pipiens*, with its wings in seeming repose ; and Solier asserts that *Sphex arenaria* utters a cry each time it deposits its burden. If not spiracular, it is possible the piping of these Sand Wasps is made by the friction of the shagreened edges of the ventral plates of the abdomen which are overlapped by the dorsal.

Strolling over the cliffs of Sangatte, on the French coast, in the summer of 1876, when borings were made there for the construction of a Channel Tunnel, I used to see the little black *Dasypoda hirtipes* curled up asleep like a chimney sweep in the yellow composite flowers, brushes and all. Once I picked one of the blossoms and brought it, with the bee cradled inside, indoors, and placed it on the table ; the bee, who was enjoying its highest sense of delight, never offered to move, and on being dislodged by accident coolly crawled back and tucked itself in again. On the 14th of July, the anniversary of the storming of the Bastile, at a quarter to eight in the morning, these somnolent bees celebrated their nuptial dance, consisting in a series of short aerial darts close to the ground against the briny air that blew, and then the females, proving the heavier, they were the first to desist and regain their favourite blossom, or fall plump on the earth, seeing which the males darted down, and the couples rolled over and over in the dust, or sometimes, by some strange mistake, three were thus seen engaged in hot contention. When coupled they maintained a "pip-piping!" as if they were commemorating their nuptials with the flute. It must have been about this time that the Curé of the village appeared on the scene with a man and wheelbarrow, in order to demonstrate that there was a seam of limestone containing fresh-water shells on the seaward face of the cliff. He afterwards took me to call on the doctor, who had unearthed the bones of a stranded Whale, but we found the house shut up and the doctor absent. The recent topography of the sandy plain at Calais, where the corn-fields are gay with poppies and bluebottles, is historically interesting. According to geologists the bed of the Channel has sunk down, and the beach at Sangatte is strewn with peat-balls

containing bits of reed and the elytra of green *Donacia* beetles or *gyrinus* that are washed in from submarine peat-beds, which may be seen at neap-tides; and that the shore has receded is the local opinion, for buildings stood where the sea has encroached. On the other hand, a charter of Louis VII., dated 1156, calls St. Omer, as the name might suggest, a town situated on the seashore, and maps of more recent date show a river flowing down from it that entered an inlet of the sea which crept in on the south side of Calais, and made Sangatte a promontory of the cliffs. Whether owing to blown sand pounded by the waves from the chalk flints or embankment, St. Omer, like Sandwich in Kent, no longer hears the wild sea waves. Thomas Mouffet relates that in the year 1552 he saw among the stones on the top of the Chatmell Hills two wasps that were fighting. I have seen *Vespa germanica* coupled in November. When the female hibernates she tucks in her wings. One day I saw a wasp flying about a branch where flies were basking in the sun, catch one with a snap, and, twirling it round in its jaws, slowly devour it. I secured the gourmand, and enclosed it with a "bumble," when I noticed that when the two came in contact they lifted themselves on their hinder legs and snapped defiance with their mandibles, or, fairly exasperated, they rolled over and indulged in a tourney, breast to breast, with extended stings. All the time the "bumble" maintained an angry vitreous whine; sometimes both hummed, and then usually their wings were agitated, but at times those of the "bumble" seemed in repose. Doctor Landois affirms that the male of *Bombus terrestris* hums in A, and its portly female a whole octave higher. The call of the queen bee to swarm is well known to bee-keepers. According to the 'Journal of Horticulture and Cottage Gardener' for January, 1876, the first queen that is matured cries in her cell, "off-off-off!" and, pushing the coverlid aside, joins the community; the other queens, as they come to maturity, also cry "off-off-off!" on hearing which the reigning queen runs to and fro in a temper, and screams "peep-peep!" which is a summons to migrate.

In Devonshire, where the twitter of a Wren in the hedge rarely recalls the clatter of the Cicada in sunnier climes, the Hover Flies that sparkle like gems from the casket make siren

melody that confers a charm to the wood-walk, where the green ribbons of the *Scolopendra* hang from the rocks, and the mossy trees are feathered over with polypody. As they here sit and sing to themselves they appear to keep their wings at rest, but, seen beneath a strong magnifying power, these are observed to be in ceaseless vibration, and when this ends the fly-music is no longer heard; yet, as Dr. Landois affirms, the melody is no doubt a fluting through the large spiracles of the metathorax, whose mouth is sometimes trumpet-shaped, as in *Syrphus baleatus*, or as in the larger *Heliophilus pendulus*, which I once carefully dissected, the two lips are covered within with a currycomb of thin membranes, suggestive of a Jew's-harp that blown upon returns a sharp sound. The little *Syrphus bifasciatus*, that balances in the air in May under the shade of the trees, and whose thorax glitters like a drop of gold as it descends when weary and sips at the blue *Veronica*, is wont to sing in contentment as it basks in sunshine on the nut-leaves; the yellow-banded *S. ribesii*, whose sluggish larva feeds on the green aphides that infest the rose-bushes when in flower at the end of June emerges from its cocoon, and afterwards, when the nuts are ripening, its enchanting melody is heard to resound like an Æolian harp where it sits recluse in sun and shade. I have heard its plaintive song in August, and it becomes a solace in the chilly days at the close of September, when the "sprink! sprink!" of the Cinereous Leaf-Cricket resounds in the blackberry-bushes. In August and September the larger *Sericomya borealis*, richly laced with gold, makes melody to itself on the moorland, and enclosed in a pill-box it continues its song. You may see it sitting and singing on the rugged Grampians, on the rocks that crown the tors of Devon, or on the Surrey hills, and I have met with it in Western France; but it is most frequently seen near brushwood that grows on damp spots. I believe I once saw the female ovipositing on a rotten stump. In the 'Proceedings' of the Entomological Society, new series, p. 85, it is stated that *Sericomya lapponum* or *lappona* makes a loud hum or buzzing during flight, and when at rest a note particularly shrill, loud, and distinct, as clear as that of a musician's pitch-key. It must be supposed that flies can hear, and that they take a delight in the songs they sing; certainly the Crane-flies have membranes on

either side at the base of the halteres, to be found with some little trouble, that suggest ear-drums.

The nuptial ceremonies of the short-lived flies are various. Friday, the 23rd of August, 1907, was fine, cloudy, and chilly in Devonshire, the wind blowing over the tors from the north, and the Swallows were flying high and wildly at noon in the scant sunshine of a woodland nook, where a wild clematis hung in festoons from a larch tree sixty or seventy feet high, up which it had clambered to the very top, a buzz as of bees fell on the ear that proceeded from a congregation of Drone Flies (*Eristalis tenax*) that were poising and chasing over the bushes on pairing intent; and in the pine forest of Bagnoles, in Normandy, on the 28th of July, 1908, I watched a male and female *Ciorrhina oxycathæ* chasing round and round among the ferns and whortleberry-bushes until they coupled. In Bingley's 'Animal Biography' we read that the males of *Tabanus bovinus* and *Chrysops cæcutiens* are fond of flowers, and that towards the close of day they are frequently seen to fly round and round in the air for the purpose of inviting their females, who prefer to prick animals for their juices, sending the cows wild with terror. I once encountered a terrible swarm of "clegs" or forest flies in the fir-woods at Fribourg, in Switzerland; I never saw the like in England or in Scotland. On the 17th of August, during the drought that prevailed at the commencement of the autumn of 1908, I found myself on a hillside above the 'Dartmoor Forest Inn' amid a noonday swarm of circling Breeze Flies (*Gastrophilus equi*), that the Rev. Mr. Kirby calls "horse-bees"—grey-brown, mousy "bumbles" with faded wing-spots they seem to be, and yet two-winged flies. Those I captured were males, and when confined in pill-boxes they whined with all the impetuosity of bees whose brains seem confined in too small a body. Solier says:—"On the 9th of July I saw two *Chrysotoxum arcuatum* perched, one on the branch of a fir and the other on the leaf of a neighbouring beech, and both were uttering a shrill sound; flying away, they returned and settled nearer one another, and recommenced their song. When in the air they seemed to seize one another, and sometimes they fell to the ground. When they settled again and began to hum I plainly saw a vibration of the wings, and the sound intensified as it increased. The species of

Merodon also hum when they couple." In these cases it is natural to suppose that the flies hold sweet converse, and that they possess an attentive ear. The strangest courtship is that of *Dolichopus nobilitatis*, which I witnessed in a wet meadow near Maida Hill, in London; the female sat drinking on a puddle, and the male took flying leaps in quick succession around her head. I depicted the scene in my 'Insect Variety.'

The minute *Syritta pipiens*, with thick hind thighs, that nestles in the dandelion-flower at the side of the hedge, when seized by a passer-by, intimates its resentment in a cry of "pip-peep!" whence its specific nickname. The bluebottle flies—for there are two in the kitchen, one has red cheeks and the other a red beard—when caught in a spider's web, throw the wing that is free into vibration, and whine piteously.

On the 15th of June, 1874, the weather, which in Perthshire had been bitterly cold, grew milder; I then arrived with my relatives at Comrie, where mice afflicted with a kind of croup might be heard squealing on the damp spots, "whit-wee-wee-wee-way!" They were whistling at noon and whistling at ten o'clock at night, when the moths were fluttering about in the bushes. On the 16th I visited St. Fillans to see certain wych-elms mentioned by Sir Walter Scott, which did not grow there, but I heard a hover fly whining loud in a sunny hedge, and, proceeding to the spot, I found it struggling with a sulphur-belted sawfly. I captured both and placed them in a box covered with gauze, when the fly crouched at the bottom and continued its plaintive cry, while the bee walked about on the gauze with circumspection; but a few seconds had elapsed when in an after-thought it darted down and decapitated the fly. These notes seem to indicate fear or resentment; it would be curious to know how they influenced the actions of the spider or sawfly.

SOME GENERIC NAMES THAT HAVE BEEN OMITTED FROM RECENT ZOOLOGICAL INDICES.

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THE following list of forty-three names comprises the generic names of Polychæta that, proposed before 1880, do not appear in the 'Nomenclator Zoologicus' of Scudder, the 'Index Zoologicus,' or the more recent Supplements thereto by Waterhouse and Bergroth :—

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| Amblyosyllis, <i>Grube & Oersted</i> , 1857. | Leipoceras, <i>Mopius</i> , 1874. |
| Amphicorina, <i>Quatrefages</i> , 1865. | Lenora, <i>Grube</i> , 1878. |
| Aphlebina, <i>Quatrefages</i> , 1865. | Lepiphile, <i>Malmgren</i> , 1867. |
| Ascosoma, <i>Leuckart</i> , 1838. | Maldane, <i>Kinberg</i> , 1866. |
| Astægia, <i>Kinberg</i> , 1868. | Myxicola (<i>Grube</i>), <i>Quatrefages</i> , 1865. |
| Canephorus, <i>Grube</i> , 1851. | Neanthes, <i>Kinberg</i> , 1866. |
| Cirrobranchia, <i>Ehlers</i> , 1868. | Opisthosyllis, <i>Langerhans</i> , 1879. |
| Choleia, <i>Savigny</i> , 1820. | Orbinia, <i>Quatrefages</i> , 1865. |
| Chone, <i>Kroyer</i> , 1856. | Pæilochætus, <i>Claparède</i> , 1874. |
| Cirrineris, <i>Blainville</i> , 1815–28. | Paleanotus, <i>Schmarda</i> , 1861. |
| Cirrosyllis, <i>Schmarda</i> , 1861. | Palmyra, <i>Savigny</i> , 1817. |
| Codonytes, <i>Delle Chiaje</i> , 1841. | Platysyllis, <i>Grube</i> , 1878. |
| Dasybranchus, <i>Grube</i> , 1851. | Polyopthalmus, <i>Quatrefages</i> , 1865. |
| Dentalium, <i>Grube</i> , 1851. | Prionosyllis, <i>Malmgren</i> , 1867. |
| Doyeria, <i>Quatrefages</i> , 1844. | Rytocephalus, <i>Quatrefages</i> , 1865. |
| Eunereis, <i>Malmgren</i> , 1865. | Thelepus, <i>Leuckart</i> , 1849. |
| Eurysyllis, <i>Ehlers</i> , 1864. | Thomora, <i>Baird</i> , 1865. |
| Flemingia, <i>Johnston</i> , 1845. | Torea, <i>Quatrefages</i> , 1865. |
| Genetosyllis, <i>Malmgren</i> , 1865. | Trichosyllis, <i>Quatrefages</i> , 1865. |
| Iphinereis, <i>Malmgren</i> , 1865. | Turbanella, <i>Schultze</i> , 1853. |
| Irma, <i>Grube</i> , 1878. | Vandanis. |
| Lanessa, <i>Malmgren</i> , 1865. | |

NOTES AND QUERIES.

MAMMALIA.

Barbastelle (*Barbastella barbastellus*) in Hertfordshire.—On Sept. 6th I found a Barbastelle at Frithsden Beeches, near Berkhamstead. The Bat (a female) was clinging, suspended by its toes, asleep, to the trunk of a beech beneath a piece of loose bark. I was able to keep it alive and in good health for a few days, and to make some notes on its habits and demeanour in captivity. When I took it from its resting-place on the tree, and subsequently, it uttered a querulous squeak similar to that of many Bats, and during the first day or two of its captivity it occasionally uttered another note, when I handled it—a curious subdued buzzing, quite unlike anything I have heard in other species. It slept sometimes prone upon the floor of the cage in which it was confined, sometimes suspended by its toes. Its gait was similar in kind to that of other vespertilionid Bats—the typical quadrupedal walk, a foot being first advanced, then the fore limb on the same side, next the other foot, and, lastly, the second fore limb—but the legs were carried more wide of the body than they are by, for instance, a Noctule or Long-eared Bat. The flight was slow and fluttering, generally performed in the upper part of the room, but occasionally close to the floor among the legs of the chairs and table. The tail was extended and only slightly decurved. As the legs were held wide apart, the interfemoral membrane looked very large when viewed from beneath. The Bat showed the usual ability of its kind to avoid collision, and never touched an object unless it intended to alight upon it. As a rule, it turned in the air before alighting and pitched feet uppermost, facing in the direction opposite to that of its course, and obviously in the most convenient posture for taking flight again. It often attempted to alight on the ceiling, but failed to obtain a foothold on the smooth surface. Its action, however, suggested that it would have no difficulty in pitching feet uppermost on the rough roof of a cave. This mode of alighting is invariable with the Horseshoe Bats, and is occasionally adopted by Natterer's Bat. At times, however, though rarely, the Barbastelle would pitch head uppermost, or with the head at right angles to the direction of

its flight, and immediately shuffle round in order to assume the inverted position, as is the usual custom of our British vespertilionid species. The difficulty I at first experienced in getting the Bat to eat was overcome by smearing the expressed juices of a mealworm upon its nose; thereafter it ate eight or nine of these insects each evening. It persistently refused to eat some cockroaches which I put in the cage with it, and indeed seemed to be afraid of them, starting back nervously when it encountered one in its rambles on the cage-floor. After some coaxing I induced it to seize a cockroach as I held it in my hand, and it consumed it entirely, but would not take another. If permitted to do so, it always ate on the wing, rising with ease from the table on which I fed it. I never saw the Bat use the interfemoral membrane as a pouch to assist it in adjusting its grip on its prey; it seemed quite capable of overcoming the struggles of the mealworms, and a cockroach is always a spiritless, submissive creature when seized by a Bat. On two occasions, it is true, particularly vigorous mealworms were thrust for a moment beneath the Bat's belly, although not right into the interfemoral, and I have little doubt that if occasion required the membrane would function as a pouch, as it does in other species. House-flies were adroitly picked off the ceiling and consumed as the Bat flew about the room.—CHARLES OLDHAM (Essex House, Watford).

Notes on the Tuco-Tuco and the Hairy Armadillo.—The congregations of mounds of sand seen by Mr. L. E. Adams, and the sounds which he renders "Touc-Touc" (*ante*, p. 342), are made by some small rodents called Tuco-Tucos (*Ctenomys*), which live in colonies. The collections of mounds and burrows are called "tuco-tuconales," and it is necessary to ride carefully and slowly over them, the ground often giving way under your horse's feet. They are also very laborious to walk over, being sometimes extensive and very soft. Indeed, "tuco-tuconales" are among the things which you have to keep a sharp look-out for when galloping over the "camp," and soon instinctively dislike. Few people have seen a Tuco-Tuco alive and above ground of its own accord, and they seem rarely to come to the surface; perhaps they may do so at night. I obtained the remains of two species in Uruguay, viz. *C. brasiliensis* and *C. magellanicus*. The comparatively educated man who told Mr. Adams that the "Touc-Touc" was the same as the "Peludo" was, it is almost unnecessary to say, wrong—very wrong. Pelúdo is the name always used in the Uruguay camp for the Hairy Armadillo (*Dasypus seaxinctus*); it is a slightly different species to that found about Buenos Ayres (*D. villosus*), to

which Mr. Adams's note applies, but the two species are not generally distinguished, and the name Pelúdo is applied to both. And if Mr. Adams asked the Gaucho at the tuco-tuconale to catch him a Pelúdo, this would account for his getting an Armadillo. It is to some extent an omnivorous and carrion-feeder. I have never met with the name "Meluta," and do not know what it would mean. There is, I believe, no Spanish word like it. The little "Mulita" (*Tatusia septemcincta*), or "little mule," so called from its ears, is the small Armadillo which is eaten in the camp, and occasionally used to figure on the menu at the hotels in Montevideo. I had one alive, and found it exceedingly quiet and gentle in its manners. I do not think anyone I ever talked to about it, and who knew its reputation as a carrion-feeder, would think of eating the Pelúdo. — O. V. APLIN (Bloxham, Oxon).

A V E S.

Sylvia nisoria in Norfolk.—On Sept. 11th, Mr. H. A. V. Maynard, who was shooting with me at Cley, in Norfolk, secured an immature Barred Warbler. It was the only bird in the bushes, where it appeared about twelve o'clock, after a wet morning with north-west wind. It was a very conspicuous bird owing to its size and light colour. It showed no inclination to skulk, and its flight was buoyant. I am almost sure that we saw a Pectoral Sandpiper several times between the 1st and the 17th. I could always separate it at a glance from a flock of Dunlin, and I watched it once through glasses at about twenty yards.—E. C. ARNOLD (Eastbourne College).

Nesting of the Wryneck (*Iynx torquilla*).—

June 3rd.—First egg laid in nesting-box in my garden.

4th.—7 p.m. Two eggs.

5th.—8.30 p.m. Wryneck inside box, evidently intending to sleep therein, and not afterwards disturbed.

6th.—7 a.m. Four eggs in nest; bird not inside, and eggs cold.

11th.—A clutch of nine eggs now laid. Unfortunately I had been absent from home since the previous note, so I was unable to record on what day incubation actually commenced.

21st.—6.30 p.m. Four young and five eggs, one of which is addled.

22nd.—7 a.m. Five young; 7 p.m., six young.

23rd.—7 a.m. Six young; 7 p.m., seven young.

24th.—7 a.m. Seven young, one of which being dead is, with the addled egg, removed; 7 p.m., the remaining egg hatched. Incuba-

tion, therefore, takes thirteen or fourteen days. There is naturally a striking difference in the size of the young, owing to the continued laying after incubation has commenced.

July 1st.—Another dead young one removed from the nest, leaving a brood of six in all.

12th.—9 a.m. Four young have left the nest since yesterday morning, two now remaining; 9 p.m., both still in nest.

13th.—9 p.m. Only one remains.

14th.—7.30 p.m. Nesting-box empty, the young having remained within their nesting abode about twenty-one days. — J. STEELE-ELLIOTT (Dowles Manor, Shropshire).

Nesting of *Alcedo ispida*. — I can find no reference to the Kingfisher utilizing the same nesting-hole year by year, but when the nesting-site remains undisturbed it does not appear to be very unusual. Several instances have come under my personal notice, more particularly a pair that have nested close to my house for the last six years (with but one exception) have used the same excavation. Each year a spring-cleaning takes place, and the old bones are ejected before the nest-cavity is re-lined with fresh pellets. I have never yet satisfied myself that this particular pair have reared two broods in any one season.—J. STEELE-ELLIOTT (Dowles Manor, Shropshire).

Red-footed Falcon in Norfolk. — While staying in Norfolk, in September, I called on Mr. R. Clarke, the birdstuffer, at Snettisham, who showed me a female Red-footed Falcon (*Falco vespertinus*), which was shot near Sandringham about the middle of June, and taken to him for preservation. I ventured to question the accuracy of the Sparrow-Hawk eyes which he had put in, but he assured me they were right.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds, Suffolk).

Glossy Ibises (*Plegadis falcinellus*) on the Northumberland Coast. —A party of five Glossy Ibises visited the coast of Northumberland at the end of August this year. They were first seen at Boulmer, a small fishing village to the north of Alnmouth, about noon on Sunday, Aug. 30th; they were then flying in single file, and appeared to have just come in from the sea. Later in the day some boys were chasing them and throwing stones at them close to Alnmouth. Probably the birds were tired out, for subsequently they were very difficult to approach. Eventually two were shot (Sept. 1st and 3rd) by Mr. Thomas Jefferson, of Alnmouth, and presented by him to the Hancock Museum, Newcastle-on-Tyne. A third was picked up dead, and a fourth was caught in a trap the following week (about Sept. 9th), and

was kept alive at Warkworth for a few days by Mr. D. Deuchar, for whom it has since been preserved. Mr. Jefferson has furnished me with an interesting account of the birds; in it he remarks that they frequented the small burns near the coast rather than the coast itself, and that when disturbed they always flew inland. From their first arrival they remained in the immediate neighbourhood of Alnmouth. Of the two Ibises received at the Hancock Museum, one is decidedly larger than the other. There is a difference of practically an inch in length of bill ($5\frac{1}{16}$ in. and $4\frac{3}{16}$ in.), and other measurements differ in the same proportion. Both birds are in immature plumage—back dark iridescent green, head and neck dusky brown, with spots and streaks of white; but in the larger bird the feathering, especially on the breast, is distinctly closer and more mature-looking, and this, combined with the difference in size, suggests that this bird is in its second year, whereas the other is in its first.—E. LEONARD GILL.

Glossy Ibis at North Devon.—On Sept. 5th, 1906, I noticed, among some Gulls on the mud by the river at Barnstaple, Devon, a specimen of the Glossy Ibis (*Ibis falcinellus*), I am afraid I have been very remiss in not recording it before. Possibly some other observer has done so; if not, however, this may be of some slight use.—N. P. FENWICK, Jun. (The Gables, New Road, Esher).

[Mr. Bruce Cummings recorded in these pages (1907, p. 21) that about the beginning of September, 1906, a Glossy Ibis was shot on the River Taw near Fremington, and was placed in the hands of the Barnstaple taxidermist for preservation. This is probably the bird seen by Mr. Fenwick.—ED.]

Incursion of Godwits at Yarmouth.—Not for at least eighteen years have so many Bar-tailed Godwits (*Limosa lapponica*) put in an appearance on our Breydon mud-flats as were observed during the earlier days of September. It was usually on the spring migration that this species was commonly looked for in the earlier half of the last century, when the "12th of May—Godwit day" was hailed by local gunners with considerable excitement. I have recorded ('Nature in Eastern Norfolk,' p. 237) where Gibbs, an old punt-gunner, still living, saw in the early seventies, during an easterly gale, "hundreds of thousands" constantly coming from the south-west (inland direction). I have known many a May pass by without any number, and sometimes without an individual being seen. The past May was remarkable by their scarcity. The prevalent winds were, I believe, southerly or thereabouts, and of no abnormal velocity, and what

accounted for the incursion I am at a loss to suggest. I saw a large flock on Sept. 7th, amounting to probably three hundred birds, feeding leisurely on a mud-flat, in spite of the incessant fusillade in various other directions, where smaller flocks were on the move—Knots, Curlews, Redshanks, and Whimbrel—to which at dusk an immense flight of Terns were to be added, making Breydon exceptionally lively. Every lout who knew one end of a gun from the other obtained his quota of the chicken-tame birds, which were mostly young and exceptionally fat. On the morning of the 7th I accosted a shoe-black who owns one of those “murderous” weapons—a converted rifle, whose face was bandaged with hospital wrappings. “What have you done?” I asked. “Oh,” said he, “the cartridge bust, and went off at the wrong ind of the gun; *but I’d got eight godwicks afore I done it.*” There was no sale for the victims, the taste for shore-birds having become practically extinct in Yarmouth, where not even a game-stall other than for *bona fide* game-birds now remains since the death of Durrant, of some reputation as a wildfowler himself. Gunners mostly cooked their own birds.—ARTHUR H. PATTERSON (Ibis House, Great Yarmouth).

Unusual Site for a Great Black-backed Gull’s Nest.—This summer Mr. E. H. Perry Knox Gore found a nest with three eggs on the low gravelly island—The Luck—near Killala. The Luck is a breeding haunt of Common, Arctic, and Lesser Terns. The nest was placed so low on the shore of the island that an unusually high tide would have reached it. The nearest breeding haunt of the Great Black-backed Gull is the pillar-like Rock of Dooncrista of Downpatrick Head, ten miles west.—ROBERT WARREN (Moy View).

Fulmar Petrel in the Firth of Forth.—On July 16th last, while on a visit to the Bass Rock, we found a Fulmar Petrel (*Fulmarus glacialis*) dead on the shore at Canty Bay, near North Berwick. On the following day one of the lighthouse-keepers, without knowing of our find, told us that a pair had nested on the Bass Rock two years ago, which he said was the first time the Fulmar had been known to breed so far south. However this may be, we thought its occurrence in the Firth of Forth this year should be recorded. The bird, which was not in a good state of preservation when found, is now in our possession.—W. & T. MALLOCH (Mount Pleasant, Johnstone, Renfrewshire).

September Movement of Shearwaters.—An extensive movement seems to take place with the Manx Shearwater (*Puffinus anglorum*)

in the latter end of August or early in September, during which a certain number get lost and wander inland. There are eleven instances of the occurrence of this bird in Oxfordshire or just over the borders. The month in which three of these occurred is not known. Six occurred in September, one at the end of August or early in September, and the eighth in August. This year Mr. Fowler sent me one which came from Leadenhall Market. It arrived on Sept. 21st in an advanced state of decomposition, and so was probably captured early in the month; and Mr. Whitaker kindly writes me word that one occurred at Mansfield on Sept. 15th.—O. V. APLIN (Bloxham, Oxon).

Since writing this note I have heard from Mr. Calvert that a Manx Shearwater was picked up dead in a field at Aldsworth, Gloucestershire, between two and three miles over our borders, about Sept. 15th.—O. V. A.

AMPHIBIA.

“Vertebrates of Wales and Ireland.”—In the interesting notes by Mr. H. E. Forrest on the “Vertebrates of Wales and Ireland” there is a statement that I beg to correct, *viz.* that “the Toad is absent from Ireland” (*ante*, p. 323). This is accurate regarding the Common Toad, but in parts of Co. Kerry the Natterjack Toad is met with, but whether indigenous or introduced, as is said of the Frogs, I cannot say.—ROBERT WARREN (Moy View, Ballina).

[Mr. Forrest informs us he is sending some brief Corrigenda for insertion in the December ‘Zoologist.’—ED.]

NOTICES OF NEW BOOKS.

From Ruwenzori to the Congo ; a Naturalist's Journey across Africa. By A. F. R. WOLLASTON. John Murray.

THE "Mountains of the Moon" or Ruwenzori, in Equatorial Africa, discovered by Stanley in 1888, have greatly interested zoologists as well as geographers. To a zoologist, Mr. Ogilvie-Grant may be given the credit for the inception of the expedition, whose journey is described in this volume, and to which Dr. Wollaston acted as medical adviser, and collector in the botanical and entomological departments. The considerable and valuable material—both zoological and botanical—was intended from the first for the British Museum, and much more will be heard of it during the next few months in a series of reports made by the staff of that institution in the 'Transactions of the Zoological Society of London.' The botanical results have already appeared in the 'Journal of the Linnean Society.'

This volume describes more particularly the country in which these collections were made, and by a wealth of photographic illustration gives a full introduction to the geographical, botanical, and anthropological features of the region—in fact, of the environment of the many species collected. Those who peruse books on African travel cannot neglect it, and to those who study the collections it is indispensable.

We are glad to read, in contradiction to our experience in the Transvaal, that despite the current idea that it is only in Europe the birds can sing, Dr. Wollaston heard in Uganda and in the neighbouring parts of the Congo State "such a morning chorus of birds as can only be equalled at a May sunrise at home." At Kamimbi the *Chef de Poste*, Lieutenant de Rossi, had a wonderful faculty of taming the birds and beasts with which his house was filled. A young half-grown Chimpanzee had acquired an extraordinary affection for him, and would

hardly let him go out of its sight. "It used to sit on a chair at the dinner-table and drink its soup with a spoon in the most ludicrously grown-up manner." Chimpanzees go far up the mountains in search of food, and traces of them were found on Ruwenzori at a height of nearly ten thousand feet, where they had been feeding on the berries of a podocarpus.

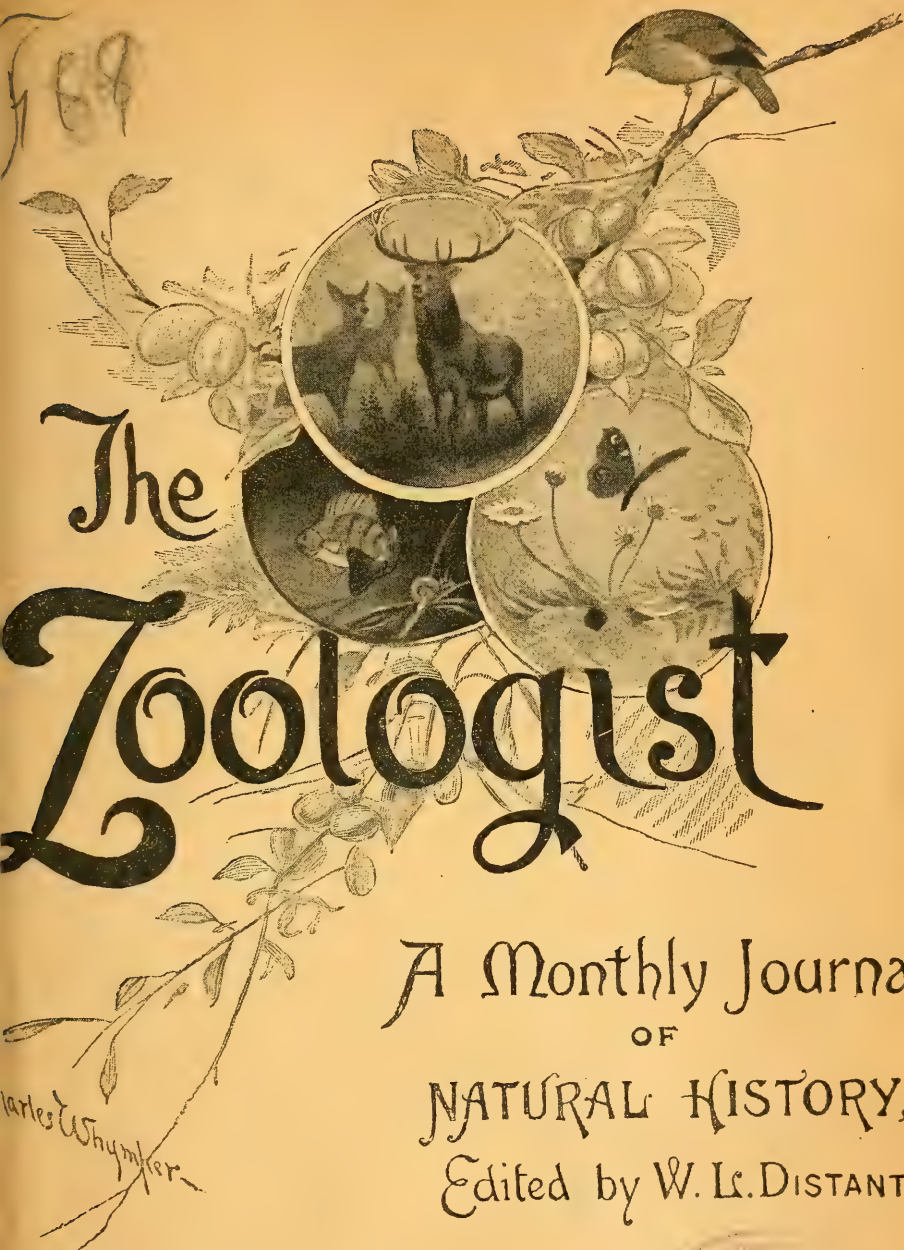
Dr. Wollaston is of opinion that the Okapi is probably more plentiful, or less scarce, in the Semliki and Ituri forests than elsewhere. The Pygmies, who can climb trees like a Squirrel, and can pass through the thickest jungle without disturbing a twig, shoot these animals occasionally with spears or arrows, and sometimes catch them in traps, "and it is through them that most of the Okapis now in Europe have been obtained." Lions are not absent from the east side of Ruwenzori. "On one occasion a party of Lions elected to spend a 'week-end' pig-hunting in the valley. Between Saturday and Monday they killed four wild pigs within half a mile of the camp, and, according to those who were there at the time, the shrieking of the unhappy victims was most terrible to hear." In Africa certain birds always remind us of home, and at Lake Naivasha Dr. Wollaston's party disturbed a pair of Greenshanks, "which whistled as they went away, and reminded me of many happy days spent searching for their nests in Sutherland."

How to Attract and Protect Wild Birds. By MARTIN HIESEMANN.
Translated by EMMA S. BUCHHEIM. Witherby & Co.

THIS is an excellent brochure on a fascinating subject, and one of no inconsiderable importance to the horticulturist and forester. The author was commissioned to give a clear account of the principles and of the measures which Baron von Berlepsch has advocated and successfully carried out on his estate at Seebach, in the district of Langensalza, in Thuringia, and no reader of his pages will deny that he has ably fulfilled his task. It is now a decade since Mr. Masefield gave us his small book on "Wild Bird Protection and Nesting-boxes," and those who possess it should place Martin Hiesemann's publication by its side.

Some quotations given from Baron von Berlepsch are at the very root of the undertaking: "We can only preserve and increase our birds in the long run by restoring to them the necessary conditions of life—above all, the opportunities for nesting of which we have robbed them." The Baron, after years of observation, had established the fact that the nesting-holes which the birds preferred were deserted or uninhabited Woodpecker holes. This led him to conceive the idea of continuing the work of the Woodpecker by the hand of man—in other words, to make close imitations of the Woodpecker holes, and which should be exact copies of Nature. These nesting-boxes are well described and fully figured. There are also chapters on "Provision of Nesting-places for Birds breeding in the Open," on the "Feeding of Birds in Winter," and on the "Suppression of the Enemies of Birds." In the latter category the Squirrel and the Jay are fully convicted.

The wide circulation of this or similar publications will in many cases do as much good as a prohibitive Act of Parliament.



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GOLDEN EAGLE (*Aquila chrysaetos*).

THE ZOOLOGIST

No. 809.—November, 1908.

EXPERIENCES WITH EAGLES AND VULTURES IN THE CARPATHIANS.

By R. B. LODGE.

(PLATE IV.)

A most enjoyable visit to the Carpathians in September, 1908, has enabled me to obtain some fine photographs of Golden Eagles, Griffons, and Ravens, and an account of my experiences with these birds may perhaps be of interest to readers of 'The Zoologist.'

On Sept. 1st we rode up one of the highest peaks with a long string of pack-horses carrying tents and provisions for a fortnight's stay, and after a day's Trout-fishing in the beautiful lake, on the shores of which our tents were pitched, we looked about for a convenient spot where we could put into execution our plans, long contemplated, of making an attempt to photograph the Eagles and Vultures of these regions. We had even a faint hope, unfortunately not fulfilled, of attracting within the range of the camera the great Lämmergeier (*Gypaëtus barbatus*), which not so many years ago was to be found there.

After some search we found, on the ridge very near the summit, a convenient crack or fissure in a big rock, which looked as if it could be converted into a good hiding-place with a little labour. Accordingly, a wall of rough stones was built up at one side and in the front, while a sloping roof of pine-boughs

resting against the large rock was carefully covered over with turf. In this ambush I spent nine days watching the carcase of a horse which we drove up and shot about eight or nine yards in front of the camera.

I had not taken up my position very long on the first day before the "swish, swish" of many powerful wings beating the air and the sound of their guttural croakings on all sides told me plainly enough that the Ravens were beginning to assemble for the feast, and I soon had proof that, hidden away in my rocky chamber, I was perfectly invisible even to their keen sight. One of them even settled on the turf roof just above me, loosening some of the soil which fell on to my head. Directly afterwards I had the pleasure of seeing first one and then another hop into the field of the camera, until there were eight or nine of the sable marauders congregated on the body, one sitting on the stiffly upstretched hind leg, another on the head, one on the belly, and the rest looking for some place of vantage from which to begin operations. But, after picking out the eyes, the tough skin resisted all their efforts, and for some days they could do but little, and after clustering round the body in black clouds would leave the spot as soon as I appeared in the morning. Sometimes they would not appear again all day at the carcase, but their croaks could generally be heard in the neighbourhood.

It was bitterly cold work waiting so many hours—generally nine each day when the light was fairly good—at such an elevated post, 7000 ft. above sea-level. Sometimes there was a heavy cold mist and snow, and always a piercing wind which penetrated freely through all the numerous cracks and fissures in the rocky chamber in which I was hidden, and for eight days I did little but sit and shiver in spite of the thick garments and rugs I took up with me. Putrefaction in consequence was not very rapid, and, as the birds appeared unable to make an entry, we found it necessary to assist the operations of nature with an axe.

The first Eagle to appear was an Imperial (*Aquila imperialis*). Looking through the camera I saw a large bird flying towards the bait, which presently settled, or appeared to do so, on a rock a little beyond where I could see it. I saw no more for some time

but probably, after the nature of Eagles, it was cautiously scanning the whole neighbourhood before venturing any further. Presently its head appeared above the edge of the rocks close to the bait, and then the bird very slowly and with great caution perched on the head of the horse, where I photographed it. The light, however, was very dull, and, as I expected, the photograph is not a very successful one. Whether it heard the click of the shutter or not I cannot say, but it disappeared as silently as it had come. For some days after this I saw no more visitors except the Ravens, and had plenty of time and opportunity to watch their antics, which are sometimes amusing. The humour of a Raven, however, is of a somewhat quaint and grim character. For instance, after they have picked out the eyes and devoured a great part of the inside of a dead animal, they appear to be seized with misgivings that perhaps it is only asleep after all, or only pretending to be dead; so to make sure one of them will solemnly walk up and give it a dig with its great horny beak in the ribs or on the face, and then jump up three or four feet into the air, as if afraid of it suddenly coming to life again.

One day I had a visit from a Golden Eagle, which appeared silently and suddenly in much the same way as the Imperial had done; it even settled on the highest portion of the bait, but just as I was in the act of releasing the shutter it departed suddenly before I could do so, leaving me much disappointed at my failure to seize such an opportunity. Then came a day of expectation and hope, which resulted in nothing. My friend and host had told me that while fishing in the lake below he had seen several Vultures, both *Gyps fulvus* and *Vultur monachus*, flying about as if anxious to go to the bait, but that they were pursued and driven off by an Eagle.

I had in the meantime arrived at the conclusion that something of the kind was going on from the noises I had heard all one afternoon. For hours I had heard the beatings of heavy wings, evidently, from the sound, much more powerful than any Raven's wings, and it had seemed to me that some aerial combat was raging round me. Buried alive in my rock-tomb, and unable to see anything except through the camera, I could only guess at the truth; but I felt nearly sure that an Eagle of some sort was

endeavouring to drive away a Vulture or Vultures. The noise they made was terrific. It really sounded as if two express trains, or perhaps two airships, were rushing through the air in deadly combat. Mingled with the flapping of immense wings I could hear cries of rage and once or twice actual blows struck. All this seemed to be quite close, as if the duel was being fought round and round the rocky pile in which I was concealed. But I could see nothing; momentarily I expected something to alight on or near the dead horse, but all I could actually see was their great shadows gliding past me at lightning speed. This went on for quite two hours, until by degrees the noise became more and more distant, as though the Eagle had succeeded in driving his antagonists away from the scene.

On returning to our camp my suspicions were verified as before stated. This is the second experience I myself have of the antagonism existing between the Eagles and the more ignoble Vultures so graphically described by the late Crown Prince Rudolph, the first being in Spain, where I had seen a Bonelli's Eagle strike down a Griffon Vulture which had presumed to approach it too closely.

The next day the Eagle again appeared quite close to the carcase, and was in the act of attacking it when it suddenly flew off, and again I heard the same conflict going on, but on neither occasion did the Eagle return after driving away the Griffons, or whatever they might have been. I had now spent eight days without much result, and I made up my mind that if I could only succeed in photographing that Eagle I would shoot it as the only chance of being able to do the Vultures; for as matters stood it did not come itself at all freely, and would not allow anything else to come.

I only had one more day as we had arranged to return, but on this last day my luck changed. To begin with, the light was good; the sun shone splendidly and brightly, and I began by making sure of the Ravens in various good positions. Then the Eagle appeared, at first near the horse, only half showing above the rocks; but it soon advanced, and sat on the highest part in a splendid attitude clearly defined against the sky, and, after looking round defiantly, began to tear at the meat. Needless to say I lost no time, but exposed plate after plate as fast as I could

get them into the camera; and I felt sure that the light was sufficient, and all the conditions most favourable. After thus exposing seven or eight plates I carefully moved on one side the camera after loading my rifle, which rested against the rock behind me, and, taking as good an aim as I could in my cramped and awkward position, I fired, and the Eagle disappeared into space behind the horse down the side of the mountain.

One reason for shooting this bird was, as I have said, because it was the only chance of photographing the Vultures which I knew were anxious to come, and the other was that I wished to be sure in my identification of it as a Golden Eagle (*Aquila chrysaëtus*). In my own mind I was sure it was so, from the whiteness of the basal half of the tail, as well as from the build and general characteristics of the bird, but I could not be sure that the photographs would show these distinguishing features plainly enough to make it certain.

Of course, I dare not show myself in any attempt to find the Eagle—that must be left until the Jäger should come up as usual to let me out of my prison in the evening. In the meantime the camera was replaced and re-focussed in the hope of further visitors. Sure enough, before twenty minutes had elapsed the wished for and expected Vultures put in their appearance. But their manner of doing so was very curious, and nearly led to their detecting my presence. Though I quite hoped and expected they would come, I did not think that they would return so quickly, and when I heard just outside a dreadful sighing and moaning, as if something was dying in the greatest agony, I never thought about Vultures, but made sure it was the Eagle I had shot. The sounds were so painful to hear that I moved away the camera and loaded the rifle again in order to put it out of its pain, but on looking out of the small hole left for the lens I perceived, not the dying Eagle, as I had expected, but an immense Griffon Vulture advancing to the carcase. I was afraid that it must have seen me, but at once drew back, and, putting down the rifle, replaced the camera in position, and, as it still remained, photographed it as quickly as I could.

It was the extraordinary noises made by these birds—for there were three of them—which had deceived me. For some time the one first seen succeeded in keeping the rest of the party

away; when they advanced to the feast it drove them back with the same hissing and snoring which I had heard, but in a short time they were all tearing away at the horse while I was photographing unseen and unsuspected the curious scene.

Side by side with the Griffons several Ravens were also feeding, not at all alarmed at the propinquity of their colossal neighbours.

On my return to the camp that evening I had time for an hour's fly-fishing before dark, and caught the best Trout taken during our stay—a beauty of four pounds—which made a gallant struggle before being led into the landing-net.

The 9th of September, 1908, will long be accounted a lucky day to be marked in the calendar of my memory with a white stone.

LATE BREEDING OF AND RETENTION OF SUMMER DRESS BY THE GREAT CRESTED GREBE.

By O. V. APLIN, F.L.S.

WHEN fishing in a reservoir in Northamptonshire on Oct. 10th I saw an old Crested Grebe—presumably a female—still in practically full summer plumage (but possibly slightly duller than in spring), followed by two young ones barely half-grown, which uttered from time to time their usual shrill piping cry, and exhibited the stripe-markings and the disproportionately long beaks and faces so remarkable in the young of this species. There were three or four other Crested Grebes on the water which, as might be expected at that date, had assumed the winter dress, or almost so.

The curious point about this observation is not so much the lateness of the young (for, as will be remarked upon presently, this Grebe is inclined to breed late in the season), but the fact that the parent bird was still in summer dress at a time of the year when it should have been in winter plumage, or almost so. And it seems probable that the fact of the bird breeding late and attending late young, had actually retarded the usual change of plumage. And further, this looks as if it were of some advantage to a bird when rearing young to wear the breeding-dress. I could see no other Grebes in breeding-dress on the water; only one bird was in attendance on the young. So, presumably, the other parent (unless something had happened to it, which is unlikely, as there is no shooting on the reservoir and the boats were ashore for repairs) was one of those which had changed into winter dress. The condition of these latter birds precludes the idea that the unprecedented summer-like weather which prevailed at that season had anything to do with the retarded change.

The Grebes on this water are nearly always later in breeding than they are in some other parts of the country. There is little or no cover until the rushes and the beds of *Ranunculus*, *Polygonum*, &c., are up. The rushes are very late in coming up, and

the birds like to breed inside the tall rush-beds as a protection from the Carrion-Crows, which are very numerous round the reservoir, and take a great many eggs of the Coots, as well as those of the Grebes whenever they get the chance. Eggs *have* been known on this pool in May, but probably these early eggs are destroyed either by Crows or occasionally by a sudden rise in the water, the level of which sometimes rises very rapidly after heavy rains in spring. But breeding is more usual in the latter part of June and early in July. I have known fresh eggs (two nests) on July 6th in one year, and on the 2nd in another, and "sat upon" eggs (two nests) on the 15th in a third.

The late nesting of the Great Crested Grebe is alluded to in the 'Field' newspaper for Oct. 29th, 1898; some eggs were taken in Ireland towards the end of July, and the bird laid four more, which on Sept. 1st were "fairly advanced towards incubation." Nilsson, indeed (quoted by Lloyd in his 'Scandinavian Adventures'), speaks as if late summer was the normal breeding-time in Sweden. Describing its breeding haunts he writes: "And here one finds, in July or the beginning of August, four eggs." On the other hand, I have heard of full clutches of eggs found in Nottinghamshire on May 6th, and an egg laid in Oxfordshire as early as April 24th.

NOTES ON CORNISH MAMMALS.

BY JAMES CLARK, M.A., D.Sc., A.R.C.S.

THE first local naturalist to pay much attention to the Mammals of Cornwall was Jonathan Couch. In the first volume of his 'Cornish Fauna,' published in 1838, he gives an annotated list of county species, and from that time up till his death contributed occasional notes on the subject, chiefly to 'The Zoologist.' In 1849, Dr. W. P. Cocks, of Falmouth, included a list of mammals in his 'Fauna of Falmouth,' and in 1861 Dr. W. K. Bullmore, in his 'Vertebrate Fauna of Falmouth,' greatly increased our knowledge of their local distribution. From that time onwards the subject was unaccountably neglected for nearly forty years. The only indication of interest during that long period was the revision of Couch's 'Mammals' by J. Brooking Rowe in 1878 for publication by the Royal Institution of Cornwall, and the appearance of one or two notes in 'The Zoologist' by T. Cornish, of Penzance, chiefly on the occurrence of the Black Rat in the county.

The following notes are based on the observations of the writer and his pupils during the last nine years. Those made prior to November, 1905, have been incorporated in the article on Mammals in the 'Victoria History of Cornwall,' but a considerable amount of systematic observation has been carried out since that time.

The Greater Horseshoe Bat (*Rhinolophus ferrum-equinum*, Schreb.) was first mentioned by Cocks as having been found in a cave between Swanpool and Pennance Head, Falmouth, and the record is quoted by Bullmore. There is apparently no reference to any other county occurrence till 1899, when the writer discovered a dilapidated specimen in the Museum of the Royal Institution of Cornwall, Truro, marked "Looe, 11th September, 1862." Though the history of this specimen could not be traced, the handwriting on the label was identified by Canon Moor, of

St. Clement's, as that of Stephen Clogg, the well-known bird lover of Looe. Unfortunately it was literally dropping to pieces, and had to be destroyed. In May, 1901, one of the students in the Agricultural class at Liskeard killed an adult female in that neighbourhood; its head and body measured 2·25 in. in length, the tail 1·35 in., and the wings from tip to tip about 11 in. In December, 1906, J. Chiene Shepherd, of Newquay, found a male in one of the caves of Porth Island, which he nearly burned with his candle under the impression that it was a fungus. He kept it alive for several weeks, but it died during sleep, and was brought to the writer in an advanced stage of decomposition. Its head and body measured a little over 2 in. in length, and its tail 1·3 in. On June 4th, 1907, a larger specimen with a tail 1·5 in. long was killed and mangled by some boys at Wheal Golden, a deserted mine on the top of the sea cliff near Penhale Point, to the west of Newquay.

The Lesser Horseshoe Bat (*Rhinolophus hipposiderus*, Bechst.) is much commoner and apparently much more widely distributed. During the last nine years it has been fairly plentiful in several of the deserted mine-shafts about Baldhu and St. Agnes, and in one of the less frequented caves at Porth, near Newquay. Occasional specimens have been discovered in the Cathedral Cavern there, and also in the Tea Caverns near the Headland, and in two of the caves in East Pentire. The Camborne mining students reported it from the North Cliffs, and in January of this year brought in a living voucher specimen. One of the clerks in the employment of the Eastern Telegraph Company captured one at Guethenbras, near Tol-pedn-penwith, in November, 1906, and the late W. E. Baily reported it from Mousehole, near Penzance, in 1902. In 1905 it was plentiful round the old Manor House at Godolphin. It is not uncommon to the west of Swanpool, Falmouth, and has been found several times in the neighbourhood of Truro. In October, 1903, a male was captured at Turbot Point, to the south of Mevagissey, and that same autumn the species was recorded by R. V. Tellam from Bodmin. It has been reported several times from Launceston, and an example in the Museum there is marked "local." In 1901 C. Upton Tripp obtained a specimen for the writer from Altarnun.

The Long-eared Bat (*Plecotus auritus*, L.) is common and generally distributed throughout the county, except among the higher-lying villages towards the north coast and around the Bodmin Moors. It is apparently absent, for example, from Cardynham, Camelford, and St. Cleer. In the summer and early autumn of 1905 it was the commonest Bat at Millook, and was evidently plentiful at Crackington Haven and at Boscastle. A young female was captured by E. T. Price at Hugh Town, St. Mary's, in April, 1904, the only record up to the present for the Isles of Scilly. The Barbastelle (*Barbastella barbastellus*, Schreb.) was obtained by Cocks from a cave to the west of Maenporth, near Falmouth, over sixty years ago, and in Baily's collection there was a specimen captured by a fisherman between Black Head and the Lizard in September, 1895. An example was reported to have been obtained at Newquay about 1886, and to have been sent subsequently to the Museum at Launceston. The writer, however, has not been able to obtain any trace of it there, and the occurrence of this species on the north coast seems unlikely. Dobson, in his 'British Museum Catalogue,' records an example of the Serotine (*Vespertilio serotinus*, Schreb.) from Tintagel. In August, 1902, W. Thomas sent in a female obtained between Mawgan and St. Columb. The specimen was exceptionally rich in its colouring—a deep warm chestnut above and a smoky yellow below. In May, 1906, R. V. Tellam obtained an undersized, probably immature, male near Lostwithiel. The Pipistrelle (*Pipistrellus pipistrellus*, Schreb.) is very common and generally distributed. It has been seen on the wing at Truro in every month of the year, and on Jan. 9th, 1904, several were flying about at noon in the gardens at Tresco Abbey, in the Isles of Scilly. Two specimens of Natterer's Bat (*Myotis nattereri*, Kuhl) were obtained by Couch from Looe in 1852. It does not seem to have been noted in the county again till the autumn of 1900, when a Bat "quite white below" was reported from the Lizard, and in September, 1902, a female was sent in from that district. Daubenton's Bat (*M. daubentoni*, Leisl.) was recorded by Couch from Looe, and by Cocks and Bullmore from Falmouth. In 1900 M. H. Williams, of Pencalenick, Truro, sent in a specimen for identification that had been killed quite close to the house,

and Bats, probably of this species, have been occasionally watched flying persistently backwards and forwards over the ponds there. In August of the present year a female was killed by a farm labourer near Polperro, and sent in the flesh to the writer. An example of the Whiskered Bat (*M. mystacinus*, Leisl.) was obtained by R. O. Waters, of Truro, near Fowey on Aug. 24th, 1901. In captivity it was restlessly active, and curiously agile and dexterous in its movements when not aware that it was under observation. It was extremely timid, and for several days refused all food. Gradually, however, it took to eating finely chopped raw meat in the dark, but refused freshly killed insects. It was highly sensitive to sudden illumination, and when the corner of the cloth that usually covered the cage was lifted, even in a room with a north light, it would dash excitedly from side to side for a minute or more, and would take no further food for a day or two. In a north room it was not at all affected by the dawn. At the end of a month it was as wild and unapproachable as when first captured, and was consequently taken back to Fowey one evening and liberated.

Among the Insectivora, the Hedgehog (*Erinaceus europæus*, L.), the Mole (*Talpa europæa*, L.), the Common Shrew (*Sorex araneus*, L.), and the Water Shrew (*Neomys fodiens*, Pall.) are plentiful and generally distributed. The Pigmy Shrew (*Sorex minutus*, Pall.), though widely distributed, is probably scarce, and has been overlooked by previous naturalists. The first specimen seen by the writer was captured alive at Launceston Castle in June, 1900. Photographs of this and of the other Shrews were shown to the members of the Agricultural class at Liskeard, and as the result an example of the Pigmy Shrew was brought in the following year from near St. Keyne. In 1903 F. J. Polkinghorne trapped two at Bodmin, and one was identified in the early autumn near Truro. Several have been obtained since in the Truro-Falmouth district, and in the spring of 1907 one was brought in from Lostwithiel. It has been reported from Helston and Trevaylor, near Penzance, but the writer has seen no specimens from further west than Maenporth.

The Fox (*Vulpes vulpes*, L.) is generally distributed in suitable localities throughout the county, but has its strongholds in the rough broken cliff-land of the coast, where it is locally plentiful.

In a big patch of dense oak-scrub between Millook and Dizzard Head, Foxes and Badgers live side by side, the latter in astonishing numbers. The association is on the whole an amicable one, but occasionally there is violent nocturnal commotion in the colony. The Pine Marten (*Mustela martes*, L.) was undoubtedly common in the eighteenth century, but rapidly diminished in number towards its close, chiefly, in Couch's opinion, because the numerous pollard trees that were permitted in olden times to grow about the homesteads for the sake of fuel were cut down as coal came into use among the farmers, and so the safe and congenial shelter afforded by the hollow trunks for these and other members of the Weasel family was destroyed. In 'The Zoologist' for 1878 (p. 127) E. H. Rodd mentions the occurrence of a Pine Marten in the Glynn Valley, near Bodmin, about the year 1843, and records the capture of a full-grown specimen in the neighbourhood of Delabole quarries in March, 1878. Somewhere about 1885 it seems another example was killed in the East Looe Valley, a few miles from Liskeard. The animal was stuffed by John Ough of that town, and was seen at the time by several local naturalists who are still living. Unfortunately John Ough's private memorandum book has been mislaid, and may have been destroyed, and up to the present there is no information as to the Marten's captor, or as to the destination of the stuffed specimen. This last reported occurrence of the Pine Marten in Cornwall was brought to the writer's notice by J. C. Tregarthen. There is an example in the Museum of the Royal Institution of Cornwall, Truro, but its history is not known.

The Polecat (*Putorius putorius*, L.) is now very scarce, but can hardly be called rare, as it still breeds sparingly in the rough, wild cliff-land of the north coast, and occasionally at least on the south. Though the majority of reputed Polecats killed in the county are domestic cats run wild, the writer has during the past nine years seen six genuine Cornish examples of the species—three from between Tintagel and Widemouth Bay, one from near Launceston, one from Chacewater, and one from the Land's End district. In addition to these, Tellam has reported one from Bodmin, H. Harris of Knighton's Kieve two from between Bossiney and Boscastle, and Sandercock one from

Penryn, all of which may be accepted without hesitation. The Stoat (*P. ermineus*, L.) is common and generally distributed. White and pied examples are occasionally met with, but individuals in true winter pelage are rare. One beautiful specimen, white all over except for a triangular speckled patch of brown and white between the ears and nose and the customary black tip to the tail, was caught at Killiow, near Truro, during the blizzard of 1891. Another with the brown colour somewhat more pronounced on the head was taken between Mawgan and St. Columb in February, 1907. Canon Thynne examined a similar specimen that had been trapped near Kilkhampton in the early spring of 1895. Pied and white Stoats are well represented in the Museum of the Royal Institution of Cornwall, Truro. The Weasel (*P. nivalis*, L.) is widely distributed, and on the whole fairly common. Pied and white examples are more rarely met with than in the case of the Stoat, but the Truro Museum collection contains several, none, however, of recent date. The Badger (*Meles meles*, L.) is remarkably common locally in the woodlands, on the broken cliff-land, and among old mine-shafts and deserted workings, and it is so generally distributed that there are few, if any, parishes in the county in which it is not resident. It is abundant in the Land's End district, where, as J. C. Tregarthen says in a letter to the writer, there is hardly a croft it does not traverse in its beats, or in which it has not an earth. It is very common around Camborne, Redruth, and St. Agnes, in the Fourburrow county, and in suitable localities throughout the Truro-Falmouth district. It is obviously plentiful, too, around Bodmin, St. Austell, Liskeard, Looe, and Launceston, but the maximum density of population is reached in sundry large patches of scrub on the irregular cliff-face of the north coast between Tintagel and Widemouth Bay.

The Otter (*Lutra lutra*, L.) is plentiful and generously distributed throughout the streams of the county. It is of frequent occurrence in the open sea and in caves along the south coast, and occasionally ventures into the estuaries of the Looe River, the Fowey, and the Fal. On the north coast it is rarely seen in the open or even in the estuaries, though its traffic is usually conspicuous along the banks, not only of the larger streams but also of many of the insignificant brooks that empty into the

Bristol Channel. Its favourite haunt during the greater part of the year is the rocky bed of the streams that tumble down the steep sides of the Bodmin Moor plateau, though it is always well represented in the middle and lower reaches of the rivers as well, and there is probably not an unprotected watercourse or pond in the county that is not visited by this predacious animal. The Common Seal (*Phoca vitulina*, L.) occurs locally along the north coast from Marsland Mouth to Pendean. A few frequent the rocks at Cape Cornwall, and groups are occasionally noticed on the Brisons. It is often reported from the Land's End round to the Logan Rock, and for the last three years Seals have been frequently observed a little to the west of Lamorna. Further east it is rarely seen on the south coast, and most of those reported from the English Channel are Otters. One, however, was seen at Black Head and two at Coverack in the autumn of last year; the late Matthias Dunn saw them occasionally on the rocks near Gorran, where they reappeared for several weeks in the autumn of 1906; stragglers are at long intervals recorded from the neighbourhood of Polperro, and in 1861 one was killed in Whitsand Bay east. It evidently breeds in small numbers on the lonely shores of the Bristol Channel. Baby Seals have also been taken or seen on the beaches at Porth Chapel and Porthcurnow, and have been reported from Porthgwarra, and from the northern extremity of Whitsand Bay west. This species is completely replaced at Scilly by the Grey Seal, as Dorrien-Smith knows of only one specimen being with certainty identified there during the last forty years. The Grey Seal (*Halichærus gryphus*, Fab.) has its headquarters on the Isles of Scilly, where it is remarkably common, especially among the western islands, Roseveare, Rosevean, and Gorregan. On the writer's first visit to these rocky islets one fine day in May he was able, with the aid of a glass, to count seventeen at one time on Rosevean and Gorregan alone. The heaviest killed by Dorrien-Smith weighed 672 lb. Adult specimens have been seen on the mainland coast at Boscastle, at Padstow, at Porth Island, Newquay, the last in September, 1907, at Zennor and near Pendean. It has also been reported from the Brisons, from Tol-pedn-penwith, and from near St. Loy. White pups of the Grey Seal have been taken several times on the mainland, but Millais thinks it improbable they breed there.

The Squirrel (*Sciurus leucurus*, Kerr) appears to be extending its range in Cornwall. It is at present abundant throughout the Truro-Falmouth district, but seems to be absent from the west and south-west, while in many parts of the east and north of the county it is scarce or altogether wanting. The Dormouse (*Muscardinus avellanarius*, L.) is widespread but local. Though apparently scarce in the Hayle, Camelford, and Callington districts, it is common in places about Helston, Falmouth, Truro, Lostwithiel, and Liskeard. Up till three years ago it was fairly common about Newquay, but lately has become scarce. The Brown Rat (*Mus decumanus*, Pall.) is generally distributed and much too common. Pied varieties are not uncommon, and an albino was killed by Mr. Henry Harris near Stratton in 1901. The Black Rat (*M. rattus*, L.) was several times recorded from the county by T. Cornish between 1878 and 1889, and especially from the Penzance district. In August, 1891, one was killed near Falmouth by a farm lad, and seen by the writer in the flesh. There seems to be no further county record till 1902, when one was caught in a trap and another seen at Heamoor, about two miles north-west of Penzance. In June, 1907, a very old male was captured at Paul, three miles to the south-west of the same town. A fine female of *Mus alexandrinus* was killed in the Falmouth Docks on June 30th, 1900. The House Mouse (*M. musculus*, L.) is abundant, and so, too, is the Long-tailed Mouse (*M. sylvaticus*, L.). The diminutive size and unobtrusive habits of the Harvest Mouse (*M. minutus*, L.) have caused it to be generally overlooked, and consequently its county distribution has not been worked out. It is locally fairly common about Penzance, and two examples have been captured at Hayle and one at Helston. Several young specimens were brought in from Pendarves by mining students at Camborne. About Falmouth and Truro it is local, but in places very common. About a dozen were obtained one day in a stackyard at St. Breward, and it is known to occur at Bodmin, Egloshayle, and Lostwithiel, so that it is evidently well represented in the middle of the county. Specimens have been obtained at St. Neot and at Launceston, but on the north coast it is either scarce or very local, as the only examples seen were from Mawgan and East Pentire, Newquay.

The Water Vole (*Microtus amphibius*, L.) is common in suitable habitats throughout the county. The Field Vole, too (*M. agrestis*, L.), is abundant, especially in low-lying, damp grass-land. The Bank Vole (*Evotomys glareolus*, Schreb.) was apparently overlooked by the older naturalists. Though probably nowhere common, it is widely distributed. The first local specimen seen by the writer was killed in Restormel Valley in May, 1901. The following month two were captured as the result of a systematic search in an ivy-covered hedgebank at Budock, Falmouth. Single specimens have been obtained at Constantine after much hunting, at Pencalenick, at Trerice, near Newquay, and in the neighbourhood of Luxulyan. On Whit-Monday, 1906, one was picked up running across the road at the entrance to Carnanton Woods at Mawgan. In spite of frequent and repeated search none have been found around Padstow or in the neighbourhood of Poundstock and Millook. In a miscellaneous collection formed by R. O. Waters, of Truro, was the skin of a Bank Vole that had been killed in the spring of 1900, about fifty yards beyond the Truro Viaduct in the direction of Idless. The Hare (*Lepus europæus*, Pall.), though formerly common over the greater part of Cornwall, is now local and somewhat scarce. The Rabbit (*L. cuniculus*, L.) is abundant almost everywhere.

The geographical position of Cornwall and the long extent of seaboard raise great expectations as to the occurrence of Cetacea, but in the past their identification has been too often a matter of assumption rather than of systematic diagnosis. During the past nine years, though Whales have several times been reported, none have been identified.

The Grampus (*Orca gladiator*, Lacépède) appeared in Mount's Bay in 1902, and again in 1905. In 1902 it was identified off Mevagissey and at Fowey. In the autumn of 1904 a young specimen about fourteen feet long was caught in a drift-net near the Wolf Rock. Risso's Grampus (*Grampus griseus*, Cuv.) has not been recorded since 1870, or the Pilot or Ca'ing Whale (*Globicephalus melas*, Traill) since 1874. The Porpoise or Sniffer of the Cornish fisherman (*Phocæna communis*, Less.) is common along the south coast, and is frequently observed on the

north. It occasionally passes up tidal rivers to a considerable distance. One six feet long and 122 lb. in weight was found dead in the mud at Newham Cove, just below Lostwithiel Moors, in February, 1903, and a still larger one was reported from near the head of Restronguet Creek in the autumn of 1906. The Dolphin (*Delphinus delphis*, L.) is not uncommon along the south coast, and has been recorded from St. Ives, Newquay, and Port Isaac on the north. A large shoal visited Mount's Bay in July, 1901, and another in May, 1905. A shoal of about twenty were seen for some days in Falmouth Bay during the month of August, 1907, and it is of frequent occurrence inside the harbour. Shoals have also been reported from Mevagissey, Looe, and Portwrinkle.

A FEW NOTES ON MYRMECOPHILOUS SPIDERS.

BY HORACE ST. JOHN K. DONISTHORPE, F.Z.S.

MY friend Mr. O. Pickard-Cambridge, in some notes on new and rare British Arachnida in 1907, writes of *Thyreosthenius biovatus*, Cambr., as follows:—"Adult females were found by myself several years ago among *débris* and grass-stems in woods at Bloxworth, but have been overlooked until recently. Its most usual habitat appears to be in nests of *Formica rufa*; but besides the above I have specimens from other localities quite away from these nests. It does not seem to have been observed yet what the terms are on which it inhabits the ants' nests, or whether these are used as breeding-places for the spiders or not, or whether they serve as shelter principally during the winter. The ant is large and protected by its coriaceous epidermis, while the spider is very minute and delicate, so that it seems difficult to imagine the latter making a prey of its hosts in any way, either in the egg or larva state; but of course there may be very minute insects in the ants' nests which in the larva or perfect state would furnish food for the spiders. The subject of insects and, besides the spiders mentioned, various other species of Arachnids dwelling in ants' nests is a very interesting one. It has been closely worked out by Mr. H. Donisthorpe, to whom I am indebted for many species of spiders he has found in nests of several species of ants. The greater majority of the spiders, however, found in ants' nests are certainly, I think, simply there for purposes of warmth and shelter during the winter, and are mostly immature."

These remarks led me to collect together and write the following notes on such spiders as we know to occur, or to have occurred, with ants in Britain. I also take the opportunity to express some views I have formed on the origin of myrmecophilous species.

Now, between the true guests of ants, the indifferently tolerated lodgers, the hostile persecuted lodgers, the true parasites,

down to the most casual intruder, there are many steps and divisions which connect them with, or separate them from, each other. Some of these steps teach us, I believe, how the more perfect types in each group have been evolved in nature. For example, a beetle which is often found with ants, but more generally elsewhere, may show us how the first steps were taken to become more fully or exclusively myrmecophilous. It may be regarded to represent an ancestral form, not of any particular species, but of the commencement of the habit of being a myrmecophilous insect, as it is quite certain that the inhabitants of ants' nests must have been evolved long after the ants themselves. If, therefore, a species is often found with ants, and often with the same species of ant, although more generally found away from them, it is quite clear that it is not there by chance. I think it is wrong to say it has nothing to do with them, but rather to regard it as a case in point of the question I have just raised. We should try and find out what it is doing in such situations, a situation, moreover, of considerable danger to a perfectly non-myrmecophilous species. The above remarks apply to spiders as well as to all other creatures found with ants. I would divide the myrmecophilous spiders into three groups:—

I. Those species which are always found with ants. They belong to the indifferently tolerated lodgers.

II. Those species which hunt and prey on ants. They are generally found outside and in the neighbourhood of the nests.

III. Those species which closely resemble ants in appearance. They hunt their prey in the neighbourhood of ants' nests, and are protected from outside enemies by their resemblance to ants.

It is very difficult to classify exactly species into these different groups without further evidence on their habits. Finally, there are a number of spiders which I have found singly in ants' nests, whose occurrence there may be accidental. They may in some cases have been carried into the nests by the ants and not devoured, or have sought the nests for the reasons given by Mr. Cambridge. But even in this latter case they may be the first steps towards a myrmecophilous habit. I may here quote with advantage a passage from one of Prof. Wheeler's publications:—"In the lives of the social insects the threptic or philo-

progenitive instincts are of such transcendent importance that all the other instincts of the species, including, of course, those of alimentation and nest-building, become merely tributary or ancillary. In ants, especially, the instincts relating to the nurture of the young bear the aspect of a dominating obsession. The very strength and scope of such instincts, however, render the insects more susceptible to the inroads of hosts of guests, commensals and parasites."

I now propose to try and classify our ants' nests' spiders into these three groups.

GROUP I.

Thyreosthenius biovatus, Cambr.—This little spider is found in the hillocks of *Formica rufa*, and anyone who cares to spread a few handfuls of the nest materials on to a sheet or paper will be sure to find it. In April, 1900, I took an adult female in a nest of *F. rufa* in Guestling Wood, near Hastings. This was its first British record! Messrs. Butterfield and Bennett tell us that it is not uncommon in nests of this ant in the Hastings district, but that the adult males are rarely found. I have found it with its hosts at Weybridge, Oxshott, Woking, Pyrford, Enfield, Blean Woods, Knowle, and Nethy Bridge. I have taken both sexes, and I may say I have found it in *rufa* nests in every month in the year. Jackson has found it in nests in the Tyne Valley, and Bagnall at Corbridge, Winlaton, and Chopwell. I believe it is to be found wherever *F. rufa* occurs. Father Wasmann records that *F. rufa* and *F. pratensis* are its normal hosts. Mr. Bagnall took a male and female in the Derwent Valley away from ants, but it is only natural to suppose that it sometimes leaves the nests and strays about in search of fresh ones.

On its habits I have the following notes:—On April 26th, 1901, I brought up from Oxshott six specimens of this spider from a nest of *F. rufa*, and introduced them into my "observation nest" of the same ant. They at once entered the galleries, the ants paying no attention to them. I did not see any of them again till June 23rd, when a female came up, accompanied by a number of young ones, so they must have bred in my nest. After this specimens were observed on June 25th, 27th, 30th; July 18th, 21st, and 27th. On Sept. 19th quite a number were walking about in my nest. The last specimen observed was on

Nov. 26th. When they meet an ant they spring with great quickness to one side. On March 14th, 1902, when I was turning out my *F. rufa* observation nest, I found in a cleft in a bit of wood the nest and eggs of this spider.

This year I put specimens into small plaster nests, with ants, beetles, and small Diptera, &c., all taken or bred out of my *rufa* observation nest. The ants never molested the spiders. On one or two occasions I saw the *Thyreosthenius* feeding on one of the little flies (*Phyllomyza formicæ* and *Sciara* sp.?), though I never actually saw the flies caught. I should say they certainly prey on small flies and other very small insects, &c., in the nests.

Evansia merens, Cambr.—This species was described from a male taken by Mr. Evans at Glenfarg, Perthshire, in 1899. Its connection with ants was not then mentioned, but Mr. Evans tells me he took it with ants. In 1901 Mr. Randell Jackson took both sexes (the female, of course, being new to science) with *Lasius niger* in Glamorgan. In June, 1903, I took a specimen in a nest of *Formica fusca* at Hayton Moss, in Cumberland, and in June, 1905, five specimens in a nest of the same ant at Barmouth. Mr. Jackson also found it with the same ant in the Tyne Valley. He writes:—"The spiders are found either in the galleries or on the under side of the sheltering stone. They are amongst the ants, and not merely hiding under the edges of the stone as so many other spiders do. They are not enclosed in cocoons, but the ants do not molest them. Adults may occasionally be found throughout the year, but most of the males are mature in September and October. The species ascends about 1000 ft. in Glamorganshire." Mr. Bagnall has taken it with *F. fusca* at Winlaton, and I found it with the same ant in September this year at Nethy Bridge, Inverness-shire.

Tetrilus arietinus, Thor.—This spider was described from ants' nests in Sweden. In 1900 I took an adult and an immature male in nests of *Formica rufa* and *Lasius fuliginosus* at Oxshott, its first record for Britain. In September, 1901, Randell Jackson took a female with brood under a stone, but not with ants, on Craig-yr-Eglwys. He mentions there were numerous colonies of *L. niger* about, but did not notice any connection with the ants. Father Wasmann gives *F. rufa* and *L. fuliginosus* as its hosts.

Cryphæa diversa, Cambr.—I took a male of this species in 1900, and a female in June, 1901, both in a nest of *Lasius fuliginosus*, at Oxshott. The only other specimen then known was a female, the type, taken on an old railway near Carlisle. In 1906 I took five females on one occasion, and several more at other times with the same ants at Wellington College.

GROUP II.

Micarisma festiva, C. K.—I have taken this species with *Formica rufa* and *Lasius fuliginosus* at Oxshott, with *F. sanguinea* and *L. niger* at Woking, and this May with *F. fusca* in the New Forest. Father Wasmann records it with *L. niger*, *brunneus*, and *fuliginosus*.

Hahnia helvola, E. S.—This spider has occurred to me on various occasions with *Lasius fuliginosus* at Wellington College. Wasmann records it from ants' nests.

Harpactes hombergi, Sep.—I have frequently taken this spider in all its stages, and both sexes, with *Lasius fuliginosus* at Oxshott; also at Wellington and Pyrford. This May I took it with *F. fusca* in the New Forest. Wasmann gives *L. fuliginosus*.

Theridium riparium, Blkw.—I have several times captured this spider with *Formica sanguinea* at Woking. Blackwell remarked that the food of this spider consisted chiefly of ants. Van Hasselt found their nests often full of remains of *Lasius niger*. Henking states that they most commonly hunt *Myrmica lævinodis*. (Wasmann gives a very circumstantial account of the capture of ants, *F. rufa*, *rufibarbis*, and *sanguinea*, by the very small *Theridium triste*, Hahn.)

Microneta innotabilis, Cambr.—I have taken specimens with *Lasius fuliginosus* at Oxshott and Wellington College, and with *F. rufa* in the former locality.

Microneta viaria, Bl.—I have taken this spider many times with *Lasius fuliginosus*, and also with *F. rufa*, at Oxshott. With the former species at Wellington College.

Leptyphantes patens, Cambr.—This species has been recently described from males and females taken by me with *Lasius fuliginosus* at Wellington College in the spring of 1906. As these are the first specimens known, and were taken in ants' nests, we can consider them myrmecophilous till the contrary is proved,

but it is impossible at present to know with certainty whether to place them in either Group I. or Group II.

GROUP III.

Micaria scintillus, Cambr.—“The grassy slopes where this spider occurs (at Portland) are also numerous frequented by a large blackish ant, to which the spider bears so close a resemblance that, even after much practice, it requires a close examination to distinguish (before capture) between the ant and the spider; both have also a similar habit of running hurriedly now and then up a grass-stem, as if to get a larger range of view—or it may be that both are in search of the same prey; both, again, on the first inkling of danger, betake themselves to the shelter of the tangled grass, and to the stems and roots of other low herbage” (Cambridge). It will be observed that this spider exhibits both active mimicry (similarity of movements) and passive mimicry (similarity of form). I have seen it running about with *F. rufibarbis* var. *fusco-rufibarbis* at Whitsand Bay.

Micaria pulicaria, Saund.—I took a specimen of this little spider in the runs of *Lasius niger* at Mickleham. It also very closely resembled the ants in colour and appearance. I have since taken it with the same ant at Woking, as well as with *F. sanguinea*:

Salticus formicarius, Deg.—In August last I took a male and two females of this very ant-like spider at Sandown, Isle of Wight. They were all running about in company with specimens of *Myrmica scabrinodis* at the roots of some *Lotus major* at the foot of the cliffs. In life they bore the closest resemblance to the ants. Father Wasmann generally found this species in the neighbourhood of *Formica rufa*, *F. rufibarbis*, and *Myrmica lævinodis* in Holland.

Diblemma donisthorpei, Cambr.—This new genus and species has been described by Mr. Cambridge from specimens taken by me in Kew Gardens, where I found it in some numbers last February and March. I discovered it in company with the little introduced ant, *Wasmannia auro-punctata*, to which, on account of its colour, size, and shape, it bears a strong superficial resemblance. The ant is abundant in the propagating pits, and nests in and under flower-pots, &c. The flower pots rest on beds

of shingle and cinders, and the spider is to be found among the ants under the flower-pots. I believe the spider preys on small *Thysanura*, &c., and I have seen it carrying what looked like small scale insects.

PAPERS REFERRED TO IN ABOVE NOTES.

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DONISTHORPE: "Notes on the British Myrmecophilous Fauna (excluding Coleoptera)," Ent. Record, 1902, pp. 67, 68. "Further Experiments with Myrmecophilous Coleoptera, &c.," Ent. Record, 1903, p. 12. "Myrmecophilous Notes for 1906," Ent. Record, 1906, p. 318.

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NOTES AND QUERIES.

MAMMALIA.

The Badger in Norfolk.—An interesting discussion has been running in the columns of a county newspaper with regard to the local status of the Badger in Norfolk, and several recent dates of "occurrences" have been cited in the course of correspondence which certainly suggest that its numbers at the present time have been considerably underrated. Cromer, Bylaugh (near East Dereham), Fornsett, and Fakenham (near where, one writer declares, "four or five have been taken this year") were given as localities, and Mr. A. H. Upcher, referring to an instance at Sheringham, writes: "I know of one or two [that] have been trapped there of late, and others trapped in the neighbourhood." Lubbock ('Fauna of Norfolk,' 1848) mentioned the Badger as "all but extinct with us," citing one example as being taken "about three years back near Holt," further stating that "at Honing, in the neighbourhood of North Walsham, the Badger was frequent at the beginning of this [nineteenth] century." In 1871 Mr. T. Southwell, writing in the 'Transactions' of the Norfolk and Norwich Naturalists' Society, states: "It is probable that the aboriginal race is now extinct, and that those occasionally met with are either stragglers or descended from a stock introduced in consequence of their usefulness in forming earths for the foxes." To Mr. Southwell's theory I am much inclined, in disagreement with statements made by Mr. Walter Rye, the antiquarian, and some others, who incline to believe that the primordial race has never been extirpated. Mr. Southwell gives in the 'Transactions' (1871) records of seven "occurrences" (mostly *kills*) between 1857 and 1870, the only one in East Norfolk being obtained in 1868, at Somerton, in the Broad district. In 1884 two others are recorded in the same journal.

It occurs to me that it was partly due to the spurt given to the reclamation and culture of waste lands at the time of the Napoleonic wars that great efforts seem to have been made towards the extermination of this animal, which, but for its nocturnal and secretive habits and its marvellous powers of digging, would have been much more easily cleared out—at least, as far as East Anglia is concerned. The Pagets, writing in 1834 ('Sketch of the Natural History of Yarmouth'), stated that "thirty years ago these were common, especially about Bradwell and Browston [villages within five miles of

Yarmouth], but they are entirely extirpated." A Suffolk gentleman of considerable experience as a sportsman wrote me a few days since as follows: "In my youthful days I often heard old men talking about the large Badger-earth existing in Barnby [near Lowestoft], and the beasts became such a nuisance that they made an extermination raid on them, which would be about one hundred years ago." He makes reference to one taken near that spot about twenty-five years ago, which "was shown on a handbarrow about the streets by one 'Dozy' Goffin," and cites an example killed ten years after, which I think more than probably was an escape, for at that particular time (in 1893) I was negotiating for an adult Badger with a publican at Bungay, when he wrote "his regrets that the night before my letter arrived it broke from its cage and was lost." Bungay and Lowestoft are not much above twelve miles apart.

Private communications reached me during the correspondence from one gentleman who has been trying to preserve the Badger in his neighbourhood (which he wishes not to be divulged), and with apparent success. He speaks of "the main earth . . . [in which] has been a litter for the last eight years. . . . It now resembles a fortification, and it is almost incredible the amount of sand they have worked out. Four have been taken out this year alive; last year the one . . . got took nearly twenty-four hours, after a previous ten hours' work in vain. The year previously three were unfortunately trapped." He further wrote that the captured animals were released, and that on another estate there is "at present a well-worked earth. . . . I cannot find any trace of Badgers being at any time imported; certainly it has not been done by the West Norfolk Foxhounds in the last thirty or forty years. . . . It is no far distance [a locality in South-west Norfolk] to Lincolnshire and Huntingdonshire, where they have always existed for certain." I share with that gentleman his wish that "whatever the past may have been, they will never be extinct in the future." Whether aboriginals or not, I hope that the Badgers still to be found in West Norfolk will be given a better chance than had those unfortunate Bustards which were reintroduced into Norfolk a few years since; these all too easily fell victims to unscrupulous and ignorant gunners (one cannot call them sportsmen) who would as lief, but for the law, slaughter cattle and sheep that may stray into their preserves from a neighbouring estate as look at them. It is fortunate for them (the Badgers) that they possess traits and instincts far more likely to protect themselves than had the luckless Bustards.

ARTHUR H. PATTERSON (Great Yarmouth).

A V E S.

Fecundity of the Chaffinch.—In a recent number of the 'Irish Naturalist' a statement was made by Mr. Moffat, on the authority of the Rev. Allan Ellison, from which it would appear that the Chaffinch is less prolific in Ireland than Hertfordshire. According to Mr. Ellison—and we have every reason to believe his statement—clutches of six are by no means uncommon in Hertfordshire, and clutches of five are quite unusual. It would be interesting to have observations of other readers in other parts of Britain relative to the fecundity of the Chaffinch, accompanied by a few short notes of its status. In this district I should think the average number of eggs is about 4·75. It is one of the commonest breeding birds in all our woods, and its status may be regarded as almost identical with what it was twenty or thirty years ago, or if it has varied at all it is within narrow limits. Nearly all the birds met with here in the winter are cock birds, but whether immigrants or not it would be difficult to say, but my own opinion would be in the affirmative.—E. P. BUTTERFIELD (Bank House, Wilsden).

Wrynecks in North Lancashire.—On Sept. 3rd a Wryneck (*Tyrn torquilla*) was captured alive in the back yard of a cottage at Higher Heysham, on the shores of Morecambe Bay, near Lancaster, which died soon after its capture. A second was captured, also alive, at Overton, about three miles away, on Oct. 2nd, which, being placed inside a boat-builder's shed, escaped through a hole in the roof, and was not seen again. Howard Saunders, in his 'Manual,' says that Lancashire has seldom been visited by the species of late years. Yarrell says that northward it is scarce and rare in Yorkshire, and Selby that a few only appear every year in Northumberland. Mitchell, in his first edition of the 'Birds of Lancashire,' says that, "once a common summer visitor, it is now almost extinct." Formerly it was known as the "Long-tongue" on Cartmell Fell, and in the twenties used to nest on the Frenchwood estate, Preston. In Winmarleigh, not far from Preston, as recently as the second week of June, 1883, Mr. Arthur Breadell found a nest containing seven fresh eggs, this being, I think, the last occurrence of the bird—at least, in North Lancashire—presuming that the eggs were authentic.—H. W. ROBINSON (Lansdowne House, Lancaster).

Honey-Buzzards (*Pernis apivorus*) in Lincolnshire.—I have lately seen three specimens of the Honey-Buzzard, all obtained between Sept. 24th and Oct. 5th last. Two were shot near Grantham, and the

third was secured near the city of Lincoln. It would be interesting to know whether other observers have noticed this species lately in our eastern counties, as possibly there has been a larger immigration from the Continent this year than usual. In autumn these birds leave their nesting haunts in Europe, and Gätke has observed enormous flights passing over Heligoland, travelling westward, and the late Lord Lilford also noticed these migrating flocks in Spain, journeying to the south. In his work on the 'Birds of Heligoland,' Gätke states that this species somehow always manages to avoid rough weather during the autumn migration, so perhaps it was the gloriously fine late September this year which tempted these birds to visit our inhospitable shores. I think all three specimens were immature birds, one being of an almost uniform dark brown colour.—F. L. BLATHWAYT (Lincoln).

Spotted Crake at Great Yarmouth.—On Sept. 26th I received a Spotted Crake (*Porzana maruetta*) in the flesh, which was shot from one of the dykes on the Breydon marshes. The gunner tells me that his dog had great difficulty in getting the bird to rise. The squatting habits of the Rail family are well known to all naturalists. These birds at times will allow themselves almost to be trodden on, or even taken by the hand, rather than take to wing.—B. DYE (Great Yarmouth).

September Movements of Shearwaters.—Anent the notes and remarks of Mr. O. V. Aplin (*ante*, pp. 396–7) respecting a very extensive movement of Manx Shearwaters (*Puffinus anglorum*) taking place "in the latter end of August or early in September," the following note may be of interest:—On August 31st of last year (1907) I crossed in the steamer from Heysham to Douglas, Isle of Man. When nearly half-way across, and at about four p.m., the vessel passed through a large number of Manx Shearwaters, which were evidently undertaking a migratory movement of some magnitude. The birds were not in flocks, but usually from one hundred to two hundred yards apart, and all were heading in exactly the same direction. They were crossing our track diagonally, and, assuming that the boat was going almost due west, they were making a south-south-westerly course. And so intent were they individually in keeping this direction that those birds making towards the vessel scarcely deviated from their course; consequently a number passed quite close in front of the bows during the time that we were amongst them. The flight must have been fully five or six miles in width, as we were quite twenty minutes passing through them, and the boat was making at

the least fifteen knots an hour. To what distance this movement extended to the south-south-west or from the north-north-east cannot even be conjectured. The day was dull, and the birds varied in height from near the surface to about twenty feet above the water. The concluding sentence in my diary runs :—"There being very little wind, the birds used their wings more than I have seen Shearwaters do before, but still from time to time they would make use of the side or 'shear' motion, showing alternately the dark upper and white under sides of their bodies."—H. B. BOOTH (Ben Rhydding, Yorkshire).

Old Local Bird Names.—In a well-used copy of Montagu's 'Ornithological Dictionary' of 1802 I found (in manuscript notes) the following local names for birds, some of which may interest readers of 'The Zoologist.' This copy had been for many years the one treasured book of an old Bradford worthy, now dead some twenty years. In his time he had walked many thousands of miles with his gun for the purpose of obtaining birds to set up as "specimens." Although the "specimens" were dispersed, his descendants kept this work in memory of their forbear, and, thinking that it might contain some local notes, I borrowed the book. The only notes it contained, however, were made by a former owner, and were written in a clear scholarly style. They are at the least fifty years old, and are probably nearer one hundred years old, and, as they give various localities, no doubt the author of them had travelled about. It should be borne in mind, however, that the object of the annotator appears to have been *entirely* to include *additional* local names of species to those given by Montagu, as not another manuscript note of any kind is in the book. The notes are given exactly as they appear after the following species :—

Mistle-Thrush = Greybird (Nth. Pembrokeshire), Sprite, Thrice-cock, Storm-cock, Ter-cock (provincial).

Wheatear = Cooper (Sth. Pembrokeshire).

Wren = Crackie (Nth. Devon), Cutty Wren (Sth. Pembrokeshire).

Blue Titmouse = Blüspicker (North Devon).

Long-tailed Titmouse (*vide* Lesser Pettychaps) = Featherpoke (Notts. and neighbourhood).

Chiffchaff = Lesser Pettychaps (provincial), Feather-poke (Cambs.).

Yellowhammer = Gladdie (Nth. Devon).

Common Bunting = Gladdie (provincial).

Chaffinch = Daffinch.

Bullfinch = Hoops from Hüpps (Nth. Devon).

Titlark = Meadow Pipit, provincial "Ground-lark."

Common Heron = hougie-crane (South Pembrokeshire).

Corncrake = Bean-cracker (Sth. Pembrokeshire).

Guillemot = Eligney (Sth. Pembrokeshire).

"Fulmar, Molly-mawk, or Mollemoke is the term applied by Bewick to the Fulmar Petrel; may also be called 'Whalebirds,' from their constant attendance on the Whale."—H. B. BOOTH (Ben Rhydding, Yorkshire).

Migration of Small Birds in Co. Sligo.—Our home-bred small birds, as usual, disappeared this autumn. By Aug. 31st very few were about, and by the middle of September not a Chaffinch, Greenfinch, or Yellowhammer was to be seen in their usual haunts, and neither Blackbirds or Thrushes were to be seen anywhere in this locality by that date. However, on Oct. 8th and 9th, I was fortunate in witnessing several flights of small birds, probably Chaffinches because several exhibited white on their wings, and their mode of flight was quite similar to that of those birds. About eight o'clock on the morning of the 8th a flock of fifty birds passed over the lawn close by the house here. They kept low, almost touching the tree-tops as they flew steadily inland to the south-east, none remaining to rest. On the morning of the 9th, as I was walking across one of my fields near the estuary, between eight and nine o'clock, a flock of about fifty birds flew past me, and, as the wind was blowing freshly from the S.S.E., they kept low over the trees, flying steadily inland to the south-east. A short time afterwards another flock of twenty or twenty-five birds passed, and in less than a quarter of an hour two more of about the same number passed over, none pausing to rest on trees or fields, but all pursuing their course steadily to the south-east. Only once before have I seen a similar movement of small birds, also in October. I was looking at the turnips in one of my fields when I was surprised at seeing a large flock of probably a hundred birds flying low against a strong head-wind to the south-east; they flew so low that I thought they were going to pitch on the field, but as far as I could see them they never paused in their course. About half an hour afterwards I saw another flock, but not so large, passing also in the same direction. From these occurrences I think we may safely infer that on the autumn migration these foreign-bred birds have a regular line of flight across this district of country, and are only seen when strong head-winds cause them to fly low. Notwithstanding the passage of these large numbers, they do not

appear to have left many stragglers behind them, for I observed only a few Chaffinches (six or seven birds) in my stackyard, but as yet none in the fields. It is only within the past three or four days that I observed a few Blackbirds, two or three about this place and a few scattered along the roadside hedges. — ROBERT WARREN (Moy View, Ballina).

P.S.—I beg to correct a printer's error in my notes in last month's 'Zoologist' (p. 396), on Great Black-backed Gull breeding near Killala on the *Inch*, a gravelly island. He has printed "*Luck*" instead of "*Inch*."—ROBERT WARREN.

Notes on the Ornithology of Richmond Park, Surrey.—On Good Friday afternoon (April 17th) of this year I saw on the larger of the Penn Ponds, Richmond Park, a party of four Shovelers (two pairs), and had the rare pleasure of watching these beautiful ducks for some time. As they kept well out in the middle of the water I was not sure of their species till, through the kind loan of a pair of field-glasses, I had a splendid view of them. For the most part they were merely resting with their heads under wing, only now and then rousing up sufficiently to paddle forward a few yards, and then resume their nap. On the Sunday they had gone. On Feb. 2nd there were some twenty Pochards, nearly all males, on the pond, and these had increased, on March 1st, to nearly fifty (all but six of that sex). All appeared to have left by the 22nd, but, singularly enough, a week later I found a solitary drake swimming about close to the plantation; in a few days this, too, had left. On March 22nd I was pleased to see no fewer than three pairs of the Great Crested Grebe on the large pond; they were very restless and pugnacious, and appeared now at one end and now in a remarkably short time quite at the other end, though keeping mostly in couples. On the same day there was a Dabchick there, perhaps the same which I had previously seen (Feb. 9th). This is the first year I have seen this latter species in the Park, though I think it has been seen (a solitary bird) by a keeper about this time in previous years. By March 29th there was only the one pair of Grebes, showing off to each other, and I saw the one once or twice bring up some weed in its diving, and carry it to its mate, though I did not observe that this was taken to the nest. On Good Friday the birds were busy building, and the nest was quite noticeable. I suppose that it must have been robbed, as soon afterwards both birds and nest had disappeared. I am glad to see that the Reed-Bunting seems to have established itself now about the east end of the ponds, where I had a good view of the male

on several occasions this spring. Even in February I once or twice came across one, I think a female, in some rushy ground; I have not before this year found it in the Park, though it is often plentiful on Wimbledon Common in winter. There is also a nice little colony of Tree-Sparrows here now; I often saw four or five together, and there are no doubt more. They seemed very fond of the young osiers, &c., at the east end, as did other birds; one Sunday afternoon in particular, at the beginning of June, this spot seemed alive with small birds of nearly a dozen species. The Wryneck was constantly heard here, and the Nuthatch several times. This last seemed to me more numerous last summer in the Park, being constantly seen and heard all over it in different places. The Lesser Spotted Woodpecker is almost always to be heard here, especially near the west end of the ponds, but I have not often noted the Greater species. This year I saw it or heard it several times; I suppose it probably breeds, as it is a very shy species, and not easily seen. I did not know till this year that the Whinchat was a mimic, but on May 31st one by Penn Ponds was performing wonderfully in this way; it reproduced the song of a Garden-Warbler and previously some notes of a Nightingale in a way which quite deceived me for the moment, though it was perched at the time in a young tree close by, and some distance from any plantation. Afterwards it reverted to its usual strain, which it always seems capable of varying a good deal. Another (or possibly the same bird), on the other side of the ponds, had shortly before reproduced the ordinary call of the Redshank so exactly that, though there were people walking about all round the ponds at that time, and it seemed very unlikely there could be one of the latter species about, it was some time before I could feel sure the note came from the Whinchat. This last bird was singing incessantly, and every now and then fluttering up from the bracken and off to some little distance, singing the while, rather after the style of the Whitethroat. A week later (June 7th) I found its nest under a slight tuft of grass, with five or six young a day or two old. This seemed quick work, as I saw no Whinchats at all till April 29th, and not till some few days later here. A nest of young Wheatears was found down a rabbit-burrow near by on May 31st. On May 10th two Wrynecks were seen pairing, but the nest was not found.—H. G. ATLEE (Caversham, Oxon).

[Mr. Mouritz recorded the presence of the Dabchick on the larger pond (Zool. 1905, p. 350), and also the probability of the Reed-Bunting breeding near the east corner of the smaller pond (*loc. cit.* p. 349).—ED.]

INSECTA.

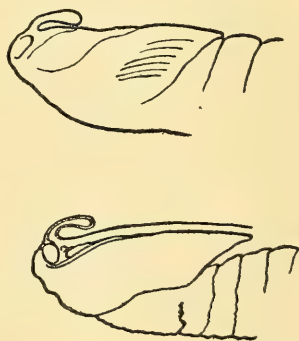
Abundance of Crane-flies at Yarmouth.—To me the most interesting phenomenon obtaining in this neighbourhood in September (irrespective of the invasion of Godwits, *ante*, p. 395) was the appearance of immense numbers of the Common Crane-fly (*Tipula oleracea*), or “Daddy-Long-legs,” a harmless enough insect in itself, but whose larva, known as the notorious “Leather-jacket,” is a most destructive creature. For two or three weeks their numbers were legion—they must have mustered in millions; they swarmed the rank marsh-grasses like locusts, and hung in bunches on the taller grasses topping Breydon walls for miles, until they looked like over-ripe reed-tufts in late autumn bursting with ripening seeds; they flew up in clouds as one brushed through the rank grasses. They were courting in the earlier part of the month, and were utterly oblivious to everything around them, and later on the females were depositing their eggs by the thousand in among the root-grasses, when those remaining upon the elevated grasses were mostly males. I was much interested in watching the seemingly much-weakened females which had deposited their eggs—some one hundred and fifty to two hundred in number, I roughly calculated in individuals—which were black and bean-shaped. They flew, or rather were wafted along listlessly, over Breydon, and feebly by the southerly and westerly winds, like so many parachute-seeds of the coarse thistle. Now and again they would lower themselves, as if to rest, when their leg-tips touched the water, on contact with which a start upwards would again be made, to be followed directly by another toe-dip. Each succeeding flight became shorter, until the weary thing would tumble on the surface, to rise once more perhaps from the crest of a ripple, and with an effort to clear itself it would once more mount a few feet. I noticed, however, that when the ovipositor had become once wetted the body appeared to lose rigidity, and successive dips waterlogged it, until at all sorts of angles and postures still weaker individuals would be struggling as they drifted by my boat. Further and further into the water the six long paralyzed legs would go, the wings being held erect as if to catch the wind, but eventually failing strength would give way altogether, and the poor brutes would feebly struggle until drowned. Thousands thus succumbed, and their dead bodies, hind legs drawn up, floated down to the sea. Queerly enough, I found hardly any males; their turn came a few days after, and by the end of the third week in September they had vanished, probably sharing the same fate. At about that time a long black wavy line, inches wide, by the sea

margin, told of their ending. I believe that some other localities were infested by great numbers of this insect, and I observed a report in the 'Daily Mail' of Oct. 12th that "they have been rising in clouds at every step on certain commons and gardens in the south of Hampshire and in Hertfordshire." That the larva of this insect does any considerable damage in marshland I cannot say—no complaints are made of it to my knowledge; and that it does not confine itself to vegetable substances as food I am assured, for in May, 1906, during a long dry period, the larvæ attacked the earthworms in St. George's Park (in the centre of the town), and both came struggling to the surface, the "Leather-jacket" remaining affixed to the centre of its prey, and draining it of the moisture in its body. Hundreds of worms thus came to the surface to die. Starlings feed upon both larvæ and the perfect insect with avidity; I have seen the gizzards of these birds packed with "Daddy-Longlegs," and observed them drilling holes in the well-shorn grassy levels of the same little park referred to, in order to get at the larvæ an inch or so down, and have marvelled at the instinct which teaches them to bore in the proper spot without loss of time.—ARTHUR H. PATTERSON (Ibis House, Great Yarmouth).

[I witnessed a similar "long black wavy line" of the dead bodies of these insects either in 1879 or 1883 on the sea margin between Yarmouth and Caister, and also in the month of September.—ED.]

Note on the Proboscis or Tongue of *Sphinx ligustri*.—The beak-like projection on the pupæ of *S. convolvuli* and *S. ligustri* is generally referred to in such a way as to leave the impression on the mind of a reader that it contains, coiled up like a watch-spring, the long proboscis of the imago. Such is not the case with regard to *ligustri*, and an examination of *convolvuli* would probably yield similar results. Of the two figures, the upper shows in outline the head and thorax of the pupa, and the lower shows the same with the horny case dissected away. The proboscis will be seen to make a loop, which lies within the beak, and its continuation passes on midway as far as the tips of the wings. R. E. RUMBELOW (Walpole Road, Great Yarmouth).

[This is not unknown to anatomists, but the point is well worthy of reiteration.—ED.]



NOTICES OF NEW BOOKS.

Conditions of Life in the Sea ; a Short Account of Quantitative Marine Biological Research. By JAMES JOHNSTONE. Cambridge : At the University Press.

THE sea and its animal life is a fascinating subject for naturalists ; for the evolutionist it qualifies and enlarges his purview if he has hitherto based his conclusions alone on terrestrial biology, while to all thinkers the conditions of life in oceanic depths is a problem they would fain solve. Mr. Johnstone's volume fully sustains the standard value in the Cambridge Biological Series, and is a welcome addition to the subjects already treated in those excellent books.

Oceanographical discovery may now be said to start from the 'Challenger' Expedition of 1872. Much was done before that notable voyage, and much more has been accomplished since, but it focussed what was then known, and so immeasurably added to our knowledge that the 'Challenger' will always be a household word among marine biologists, and its discoveries are frequently referred to in the pages of this book. Haeckel, in his 'Plankton-Studien,' gave to the terms "Plankton," "Benthos," and "Nekton" an illuminative value which nothing can dim, though, as Mr. Johnstone writes, there is of course no absolute distinction between these three classes of organisms ; "but this lack of absolute distinction, which is to be felt in all schemes of classification of natural objects, is no argument against the use of a series of terms which are sufficiently exact, are expressive, and have great practical convenience." These remarks may well be pondered by some advocates of a dogmatic taxonomy.

The struggle for existence in the sea is no less severe, if not even more so, than on land. "Countless millions of Pteropods must be destroyed by the Whales of the northern seas ; Porpoises destroy hosts of Herring, Cod, Whiting, and other fishes ; roving Sharks and Dogfishes, either singly or in shoals, must at times

produce devastation among the bottom-living fishes of sea areas ; Cod, which are themselves the prey of Porpoises, devour great numbers of fish such as Herrings, and Crustacea such as Hermit-Crabs, &c. ; Plaice and Flounders eat enormous numbers of Cockles, Mussels, and other small shellfish, and densely populated beds of these molluscs are at times decimated by hordes of Starfishes ; pelagic fishes like Herrings and Mackerel feed to a great extent on swarms of Copepods and other planktonic Crustacea, and twenty millions of *Ceratium* have been estimated in the stomach of a single Sardine." Nature red in tooth and claw is proclaimed, and in no indefinite manner, by marine biological observations, and the survival of the fittest is as much a truth of the ocean as it is on land. Sometimes observed correspondences are very curious, as when it is maintained by fishermen that the operation of the Wild Birds Protection Acts has been to cause a diminution in the abundance of Cockles in some localities, since increased numbers of Gulls were spared to eat these molluscs.

We might continue quoting biological facts and conclusions from these pages, but this is beyond the province and the limitation of reviews in this Journal. It is rather our duty and pleasure to point out a volume on life in the sea which may well be added to the libraries of naturalists, and one which is in welcome contrast in authority and scientific value to many of the so-called Nature books which are now so frequently published.

Through Southern Mexico ; being an Account of the Travels of a Naturalist. By HANS GADOW, M.A., Ph.D., F.R.S.
Witherby & Co.

WHEN Dr. Gadow is found as author of a book of travel we know that we shall enjoy the writings of a naturalist, and that the Amphibia and Reptilia will certainly not be neglected ; this anticipation is fully realized in the perusal of this well-illustrated volume, and we accompany the writer from the tropical lowlands to the mountain regions of snow, thus gaining an insight of the environment of much Mexican animal life which we may have studied previously.

We have, of course, a good account of the Axolotl, and

subsequently of the derivation of its name. "Axolotl" is the usual Aztec term for tadpole, which near Mexico city has been not transferred, but rather restricted, to the famous larva of the *Amblystoma*—in fact, "Axolotl" is simply the tadpole, and there is not much need for speaking of ordinary "taddies." Dr. Gadow naturally met with some strange experiences, and one which is not the least remarkable was the presence of Rattlesnakes in a camp on a ridge presumably at 12,500 ft. of elevation. That these snakes should have existed so close to the upper limit of life "in a climate cold even in the summer, and one implying a long term of hibernation, was certainly surprising." Again, whilst rambling along the edge of a forest a noise was heard resembling the mutter of a distant saw-mill, and, approaching nearer, the sound grew into a roar, like that of steam escaping from many engines, mingled with the sharp and piercing scream of saws. This was caused by a vast concourse of large green Tree-Frogs (*Hyla baudini*), and the resultant of the spawning females was calculated as one hundred million eggs. But now comes the recital of much wasted life, and happily so; on the party returning the next morning to photograph the scene there was not a single Frog left—"the water had all evaporated, and the whole place was glazed over with dried-up spawn. The prospective chance of millions of little Frogs was gone, their expectant parents having been deceived in calculating their day of incarnation."

Dr. Gadow reflects the growing dissent to the too much used theory of "warning coloration," and instances the case of Coral Snakes so frequently "paraded" as examples supporting that hypothesis. Black and carmine or coral-red, in alternate rings, are the usual pattern, but "upon a black ground red is the first colour to disappear, or rather to produce in combination with it a neutral tint; next follows orange, then green and blue, and lastly yellow, which is far less easily effaced than white upon black. We conclude that in most cases the combination of red and black is a self-effacing, rather than a warning, pattern."

From these quotations it will be seen that this book gives us much bionomical information from Amphibian and Reptilian observation. The account of all natural history expeditions divulges the speciality of the naturalist; frequently it is ornitho-

logical, sometimes it is mammalogical, and not unusually entomological; hence this publication, from Dr. Gadow's own standpoint and study, supplies valuable material for the evolutionist as well as information for the zoologist. We do not allude to the botanical and archæological chapters—*chacun à son goût*; we are now addressing zoologists in 'The Zoologist.'

The Origin of Vertebrates. By WALTER HOLBROOK GASKELL, M.A., LL.D., &c. Longmans, Green & Co.

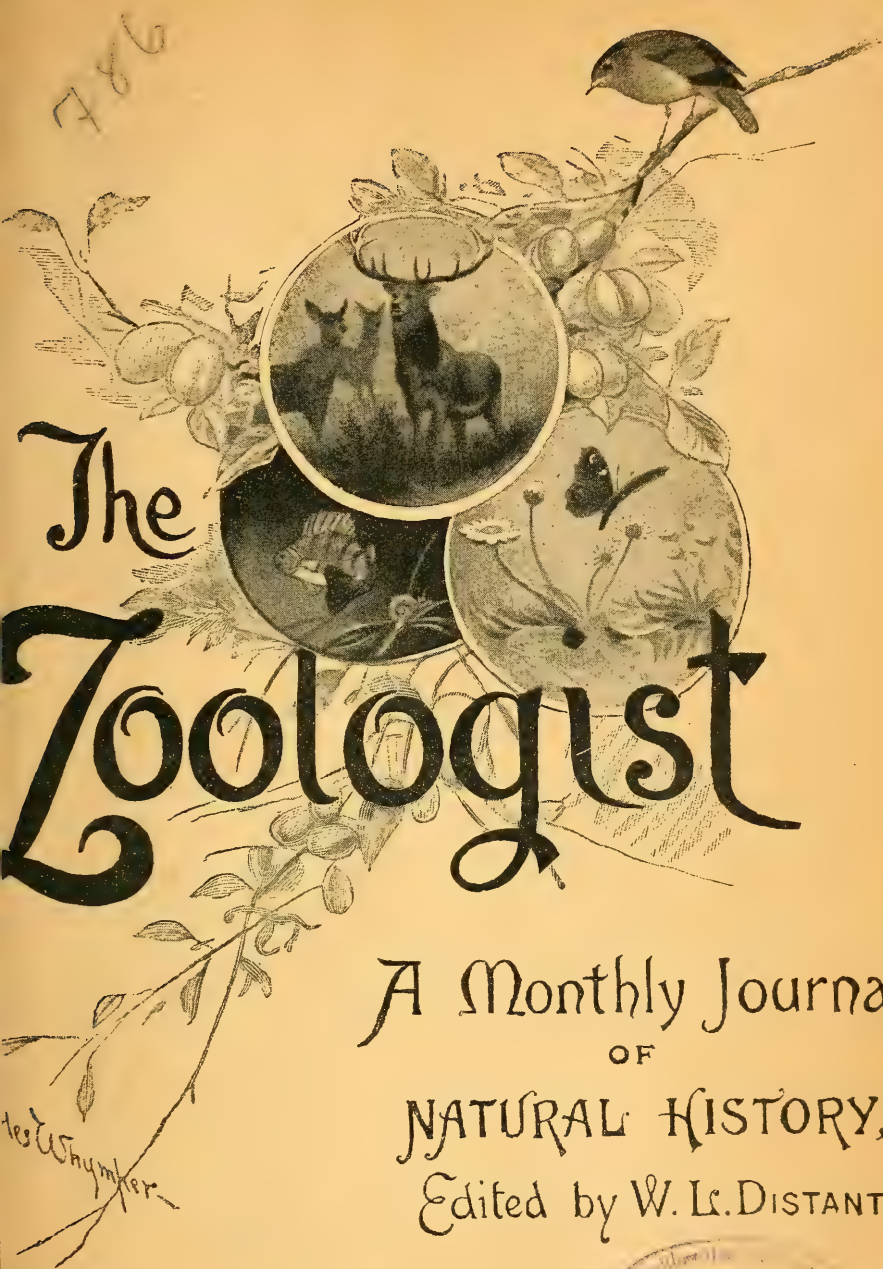
IN the author's introduction to this important book he writes: "I have been told that it is impossible for one man to consider so vast a subject with that thoroughness which is necessary, before any theory can be accepted as the true solution of the problem." The truth of this statement becomes patent to any conscientious reviewer of Dr. Gaskell's volume, for if "zoology without physiology is dead, and physiology in many of its departments without comparative anatomy can advance but little," an ordinary naturalist who may study 'The Origin of Vertebrates' must be well equipped to weigh the evidence with that judicial capacity which only special knowledge can supply, and without which no impartial verdict can be given. The theory advanced is best given in the author's own words, and is "that the so-called central nervous system of the vertebrate is in reality composed of two separate parts, of which the one, the segmental part, corresponds to the central nervous system of the highest invertebrates, while the other, the unsegmented tube, was originally the alimentary canal of that same invertebrate."

The theory is very largely a physiological one, but an excellent summary at the end of each chapter enables the student to both understand the author's progress with his argument and to again study his facts advanced in support of the different conclusions claimed in that summary. This method is exceedingly fair and thorough; we must bring both thought and knowledge to estimate the strength of this proposition, but we are never bewildered; the facts in its support are clearly marshalled and ably stated, and if some readers may not follow Dr. Gaskell in the whole strength of his conclusions, none can fail to find his time and thought have been rewarded by an exceptional exploration in

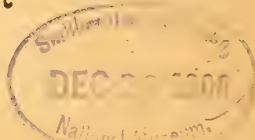
the domain of animal physiology. It is needless to say that the work is written on the evolutionary conception, pure, simple, and undefiled, for no such a discussion could be conducted on any other principle.

Leaving the physiological arena for that of more evolutionary philosophy, we are met with two aphorisms—one near the beginning, the other near the close of the volume—and these may be taken to express the result of estimating the importance in animal evolution of the different progressive planes of the central nervous system:—(1) “The race is not to the swift, nor to the strong, but to the wise.” (2) “Success in this world depends upon brains.” These statements are, of course, not quite synonymous; wisdom is not always dependent, so far as evolution is concerned, on “brains” or intellect. We have all at times met with the wise though uneducated and very average man; we have also known the brilliant and highly educated man from whom wisdom is absent; one of the greatest confusions in mental concepts of the present day being the want of differentiation between “wisdom” and “learning.” Consequently, we rather incline to the opinion that in animal evolution *aptitude* rather than *intellect* has been a more important factor. In an anthropomorphic sense we may overestimate the genus *Homo* as the evolutionary goal. Man, regarded as an animal, is gregarious, social, and predatory; the great increase in his brain power has been acquired principally in the struggle with his own species, and is conditioned more by the time- than the cosmic-process. His non-animal entity does not arise in the present discussion.

If we have not misunderstood the argument of this brilliant book, we have—perhaps and possibly wrongly—a less decided view of the central nervous system as the dominant factor in animal evolution.



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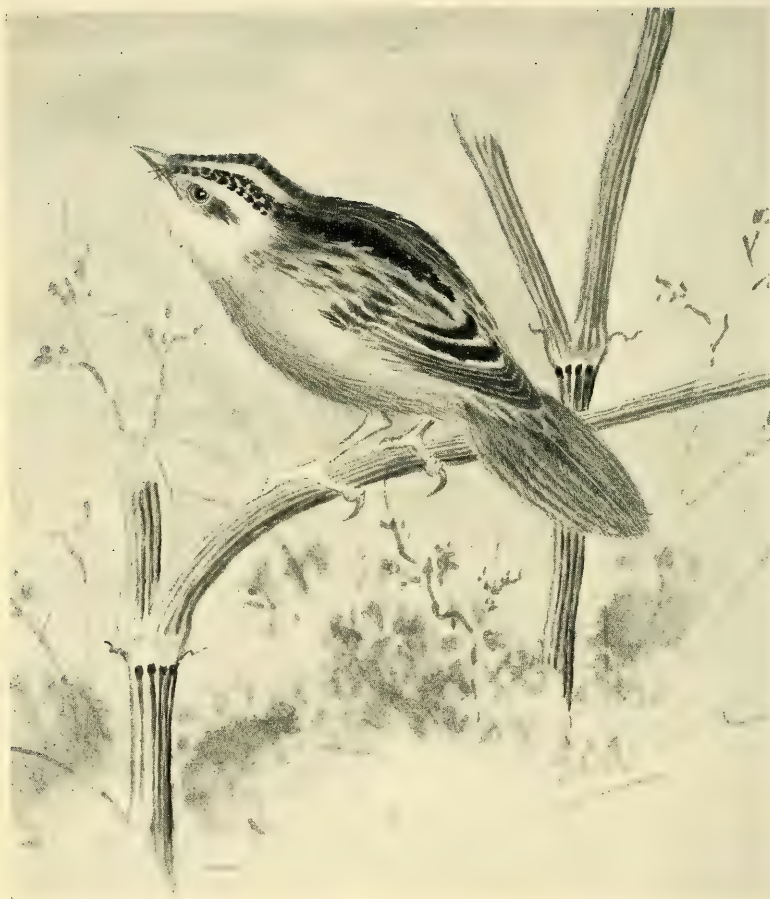
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AQUATIC WARBLER (*Acrocephalus aquaticus*).

THE ZOOLOGIST

No. 810.—December, 1908.

SOME FISH-NOTES FROM GREAT YARMOUTH FOR 1908.

BY ARTHUR H. PATTERSON.

It was with regret that I had to report last year (Zool. 1907, p. 460) a want of help from the local shrimpers because of the difficulties they experienced in not only procuring a living, but in manipulating boats and nets owing to the unpropitious conditions of wind and weather. The present spring and summer were made as notoriously blank for me by reason of the remarkable ease with which these men captured large quantities of "Pink Shrimps," *i. e.* Ring-horned or *Æsop's* Prawns (*Pandalus annulicornis*), the "sheerness" (clearness) of the water, and the striking dearth of curious and even common species of fish and crustaceans.

The shrimping season began very early, the catchers having had a most trying winter, for their boats, owing to the enormously increased number of Herring-luggers fishing out of the port from September-end to nearly Christmas-time, have to be hauled out and laid by until the end of the Herring harvest. They were wont in the old more leisurely days, before "cran-ning" the Herrings came into vogue, to go to the fish-wharf to "tell" (count) Herrings, to go occasional trips on the luggers, or to wedge themselves for the slow season into other congenial, if unskilled, occupations. But "cran-ning" altered the pursuits of others besides themselves. Fortunately, from causes which I

have been unable to satisfactorily account for, but probably from a slightly higher temperature of the water, or, maybe, from tidal influences, the "Pink Shrimps," a much more desirable, because a more saleable, species than the Sand Shrimp, *Crangon vulgaris* (local, "Brown" Shrimp), were found in goodly quantity, and becoming so numerous, indeed, in May that on some tides but one haul was taken, and a quick run back made to port, sufficient having been obtained for the "orders" and for possible private sales without the necessity or probability of throwing away those for which there might be no demand because of an overplus, which would have resulted from succeeding hauls. "It fared a reg'lar pity," they told me, "to hev to hull away what they couldn't sell!" Under ordinary conditions several draughts have to be made between the falling of the tide and the return to the harbour on the latter part of the flood-tide.

In February the Prawns ran small, and a great many of them were heavy in berry. They were reported to me on the last day of October as still plentiful, one man assuring me that in a small boat rigged expressly for winter work to dodge in and out the harbour while his larger boat was laid up, he took, on the 30th, no less than three pecks.

On Jan. 23rd I discovered a Black Sea Bream (*Cantharus lineatus*), about fourteen inches long. From inquiries made I ascertained it had been captured, with others, in the neighbourhood of Cromer Knowle, as near as my informant could be sure. Up till that time I had never met with this species off the Norfolk coast. From the same neighbourhood, on Feb. 10th, I received a very beautiful and fresh example of the Miller's Topknot (*Zeu-gopterus punctatus*), measuring $6\frac{1}{2}$ in. in length.

The shrimpers fell in with a quantity of ten-inch Codlings on Feb. 10th. From the gills of one I obtained a fine parasite (*Lernæa branchialis*), which stuck most tenaciously to its support. On placing it in formalin it disgorged so much blood that it coloured the solution, itself turning from a blood-red to a pale flesh-colour. During February I saw several lots of Sprats-large in ova.

I have not yet been able to satisfy myself that Smelts visit the Broads. Certain it is that great numbers go up the Yare to the neighbourhood of Norwich to spawn, and a great number frequent

the Bure, or North River, which connects itself with the Hickling group of broads; but, although some good hauls are netted at Runham (six miles up), and even higher, satisfactory evidence is not to hand that the fish actually go into these shallow lagoons. I know of one instance where a man at Potter Heigham trans-fixed a fine Smelt on an Eel-pick, but beyond this have no account of one taken as high as that. Potter Heigham is seventeen and a half miles by river from Yarmouth Bridge, and Norwich is twenty-six miles.

March 3rd. A ten-inch Brill (*Rhombus lævis*) turned up at a fish-stall to-day, with the upper surface of a porcelain-white with the exception of a splashing of the normal coloration round the eyes, and ten spots of the same hue, like finger-prints, placed around the edges of the fins in singular order, five on each edge. The fins and caudal appendage were, however, of the ordinary grey-brown colour.

A considerable number of Hake (*Merlucius vulgaris*) in the town on April 13th, and on the 14th several shops displayed an unusual number of Sail Flukes (*Rhombus megastoma*), several running to fifteen inches in length. These were from consignments landed in the south-west of England. I tried one of the Flukes, but found its flesh dry and insipid, more like that of an out-of-condition Whiting than a Sole, for which fish it is occasionally sold to the unwary.

On April 29th I saw a ten-inch Codling, taken on Breydon, with a very short upper lip, the lower one extending much beyond it. The fish, viewed from the front, had a curiously frog-like appearance.

May 1st. Some large North Sea Pollack (*Gadus pollachius*) brought in.

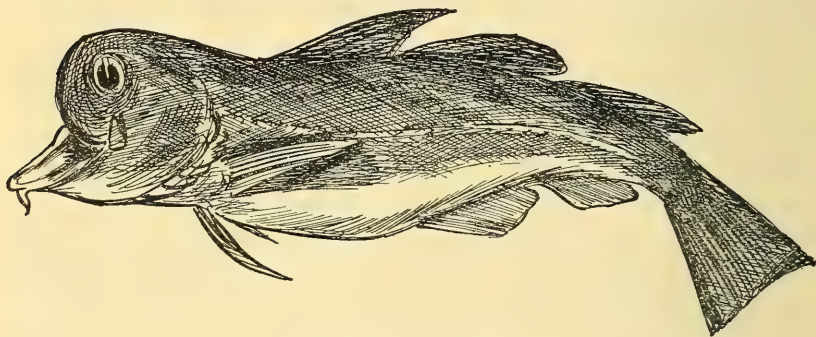
On the same date I observed some rich yellow sections of a round fish which looked uncommonly like filleted Haddocks, the colouring being much more ochreous, and the general appearance exceedingly appetising. The salesman, on my questioning him, at first professed ignorance as to its species, but with a little suggesting he at length admitted that he believed it to be crimped "Cat-fish," the local name for Wolf-fish (*Anarrhichas lupus*). "But they are selling well," he remarked with a smile, "and several stones of it had gone off during the week." He

admitted that the bright colour was due to anatto. I purchased a piece of it and cooked it like Haddock, finding the flesh fairly good eating, slightly "twanging" of a Skate-like flavour, and more salted than I cared for. Whilst examining these "Grimsby Haddocks" I noticed close by the heap a hybrid Plaice-Halibut, the second example of this cross which I have met with, that, finless and headless, weighed about $4\frac{1}{2}$ lb.

May 7th. A number of Coal-fish (*Gadus virens*) on sale.

On May 8th I had a sturdy little crustacean brought me from a shrimp-boat, which, on sending to the British Museum for identification, was reported to me as *Cirolana borealis*.

Another deformed Cod came to hand on May 14th. It weighed 1 lb. 10 oz., and was caught near the fish-wharf, in the river. The upper part of the head turned completely round



BULL-DOG COD-FISH.

from just in front of the eyes, the end of the upper lip coming in a half-circular sweep under the palate. The lower lip protruded, and had a remarkably spoon-like appearance (fig. *supra*).

I saw, on May 25th, a Sappharine Gurnard (*Trigla hirundo*), a foot in length, with a decided kink in body, much after the shape of the Smelt referred to on p. 445. On the same date I received a beautiful example of the Common Mackerel, whose deep blue back was entirely without the characteristic stripings. Length, 15 in. This is the third of the kind that has passed through my hands.

Had a very pretty salmon-coloured variety of the Common Sole on June 16th. Length, $9\frac{1}{2}$ in. It is now in the Norwich Museum.

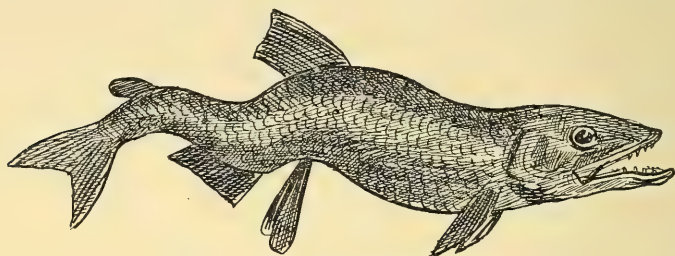
An example of the Sowerby's Hippolyte (*Hippolyte spinus*), the second only I have ever seen, was brought me by a shrimper on July 3rd.

I joined myself to a couple of rural sportsmen on July 11th, and with a "lambing-net" (a sort of bow-net held in position by a long pole fastened on to the cross-beam with a swivel) worked the ditches on a triangular area of marshes between the rivers Waveney and Yare. The drainage ditches had been recently "flushed" by an inlet of water from the river, they having become so low and stagnant from the long drought. Hoping that the "freshening" had been greatly to the enlivening of the Eels which frequent these ditches, we gave them not a little fright by "plouncing" the water, starting to "plounce" some twenty yards from the net at each "set," a process which drove the Eels towards the net as each twelve-foot pole, armed at the end by a lump of wood, stirred up the water and ooze into numerous dirty little whirlpools. The result of our fishing amounted to eighteen pounds of Eels, with the addition of a plump little Jack of some five pounds weight. We took very few Sticklebacks, on which both Jack and Eels feed; these little fellows must lead an exceedingly troublesome existence. The Eels, I feel assured, originally found their way into these ditches as elvers by working through the interstices of the sluice-gates, or when, as in the present instance, they are opened to replenish that lost by evaporation. I found that very few small Eels were obtained, the majority running from a quarter of a pound to one pound. They were of a remarkably ruddy golden hue, quite unlike salt-water Eels, and when cooked were far more oily and muddy-tasted than clean-run Eels.

During July a very crooked Smelt was taken on Breydon; the dorsal fin stood out high upon a hump, and the adipose fin behind on another, the tail being directed downwards at half a right angle, something after the fashion of a scull thrust astern of a boat (fig. on next page).

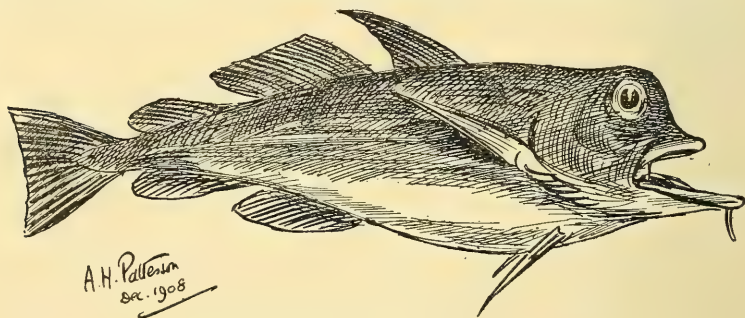
The Crucian Carp (*Cyprinus carassius*) is numerous in Fritton Lake, growing to a goodly size there, but it seldom takes a hook. It is stated by Dr. Lowe to be numerous in ponds in East Norfolk; the same writer recorded one weighing 1 lb. 7 oz. At a shallow horse-pond at Lound, on the Suffolk border, near the

Maid's Head, considerable numbers of this pretty golden-hued fish are found, rather undersized, and probably chronically hungry. I paid this place a visit on July 30th in order to secure one or two for a tank at home, and notwithstanding the freely offered advice of the village school children, who flocked



DEFORMED SMELT.

round in a crowd, I hooked a dozen Carp in a very short time. They ran to four inches and a little over in length, and took red-worms and gentles indiscriminately; they were lively enough in a small bait-can, although I had seven miles to cart them on a broiling hot afternoon, the hottest of the year. They were at home almost directly I turned them into my tank, and none have died up to the time of writing, although they get but little food,



BULL-DOG COD-FISH.

except the vegetation which grows on the sides and bottom of the tank. With them, in perfect amity, live a couple of small Roach. All of them have grown considerably since I have kept them.

Another bull-dog codling, Aug. 10th (fig. *supra*).

Some abnormally high tides occurred on the local rivers in the middle of August; in the Bure they did great damage to the fishes, and many Roach and Bream and small Pike succumbed.

A double Flounder* (*Pleuronectes flesus*), about $5\frac{1}{2}$ in. in length, was brought to me on Sept. 1st. Both sides were of a dusky brown colour, and the "travelling eye" remained at the edge of the fish in a notch, which gave it the advantage of seeing on either side, did it progress in a vertical position.

By reference to my notes in 'The Zoologist' of 1907, p. 463, it will be seen that, while Breydon and the adjacent waterways literally teemed with "herring-syle" during the month of August, Terns in unusual numbers came and remained with us for a considerable period. The water seemed alive with these young Herrings, and thousands were left stranded at each ebb-tide on the flats, entangled amongst the *Zostera*, to the huge delight of flocks of Black-headed Gulls, which eagerly snapped them up, making prodigious noise as they hovered and dropped and quarrelled for possession. From some unknown cause there was as remarkable an absence of "syle" during the unhappy summer of 1908, and all the Terns (including the Arctic, Common, and Little Tern) were also conspicuously absent—a matter of cause and effect apparent to the least intelligent. I might add that early in September these birds passed over Breydon in considerable numbers on migration. Strangely enough, the "syle" was abundant at Wells-next-the-Sea and in the neighbourhood of the Wash, where, I believe, the Terns remained unusually late. The presence of these luscious little fishes attracted enormous numbers of Mackerel into the neighbourhood of Wells, to the great temporary profit of the fishermen.

The Scad (*Trachurus trachurus*), or Horse-Mackerel, has been somewhat commonly met with during the course of the autumnal Herring fishery. No one troubles to eat the fish in this neighbourhood, and it is either cast overboard when the nets are "cleaned," or is thrown on the refuse-heap if found in the catch when in port.

A rather unexpected catch in the shape of a Salmon-Trout was made by an angler from the Britannia Pier on Oct. 28th. The fish, which took a lugworm as bait, weighed $3\frac{1}{2}$ lb. A smaller one was also taken on the same date.

Some time during the last week in October, when cleaning some Herrings, a labouring man discovered one of them to be

* Cf. 'Zoologist,' 1908, p. 353.

hermaphroditic, containing both roe and milt. Each lobe consisted of two-thirds roe, the remaining third being milt, which latter was situated at the posterior end of the abdominal cavity. This freak was kept for a week for my inspection, but got muddled away because its finder was too busy to look me up. I have twice before seen instances of this kind.

A rather unusual catch, for the time of the year, of Norwegian Lobsters (*Nephrops norvegicus*) was made early in November, a "trunk" of them being sent to Yarmouth. On overhauling a number spread in the window of a fishmonger's I discovered no fewer than five examples with distorted greater pincer-claws. This species seems more "addicted" to malformation than any other crustacean I have seen.

The Herring fishery, to the time of writing, has been up to the average, and the scene at the fish-wharf, on a brisk day, with the hundreds of steam drifters and numerous Continental cargo steamers lying along the quay for nearly a couple of miles, loading or discharging their silvery cargoes, the passing up and down the river of full or empty drifters, with smoking funnels, hooting syrens, and scale-clad, unwashed crews performing the tasks incidental to the present conditions aboard, make up a scene which absolutely beggars description; nor is the picture complete without noticing the hundreds of hurrying vehicles and busy carters, and the myriad tubs of "barrel-town" spread across the extensive Denes (sand-dunes), among which, like bees in a hive, labour thousands of Scotch fisher-girls gutting and pickling the Herrings.

Mackerel did not show up so numerously at Yarmouth during the earlier part of the fishing, but on Nov. 12th a remarkable glut occurred at Lowestoft, the Mackerel having been met with in immense shoals. At Lowestoft I hear that Mackerel were never before so plentiful, and several boat-owners hastened to change their Herring-nets for Mackerel-nets. One craft, the 'Nugget,' had a record catch; it was estimated that she landed just four "lasts," or nearly fifty thousand fish. So full of fish were the nets that not half could be stowed in the net-room, and the remainder, still "gilled," lay in the huge heap piled on the deck. "Cleaning" (emptying) the nets after a Herring haul is not a difficult task, the fishermen merely shaking the net of

the enmeshed Herrings as they proceed ; but almost every fish in a Mackerel-net has to be taken out by hand. But, aye ! what a bonnie sight is a cargo of freshly captured *Scomber*, glistening as they do with iridescent tints, to describe which the names from a colour-box are utterly insufficient to convey any idea. In some cases the Mackerel had "struck" so thickly that sections of net were "grounded," or sunk to the bottom.

A Scotch boat, having been out but a short time, put into Lowestoft on the evening of Nov. 12th with thirty crans of Herrings (nearly forty thousand fish), which had been transferred to her at sea from the Banff drifter 'Violet,' the latter having made a haul which she could not safely carry ; she had on board herself no fewer than two hundred crans (two hundred and sixty-six thousand six hundred Herrings !).

I have to record, as usual, the fact that no Cetaceans, to my knowledge, have been brought into port during the present Herring fishery. I understand that Porpoises and other "large fishes" have been seen on the fishing-grounds, and it is evident that some Porpoises at least have come to grief and been drowned in the Herring-nets, but as no value attaches to Cetaceans or Sharks nowadays, either for economic or curious purposes, they are invariably thrown back into the sea. At one time Sharks of any size were eagerly snapped up by showmen, but since the various markets in the county have been closed to promiscuous show-work, and sanitary officials have more sense (?) than sentiment, they, too, place stumbling-blocks in the way of exhibition : so that the pseudo-fisherman who erstwhile used to dilate upon these "terrors of the mighty deep," and the "pounds and pounds worth of damage done to the poor fishermen's nets, for whose benefit they were travelling," has become a creature of the past. Time was, some forty years ago, when Porpoises fetched as much as five shillings apiece for the sake of their skins, which were much used at that time for water-boots, and for the oil extracted from their fat. Our local tanneries are also entirely obsolete. Two Porpoises, in a forward state of decomposition, were washed ashore during the easterly winds prevailing during the first week in November. The Gulls seemed to have been very busy upon these carcasses before they had washed ashore.

NOTES ON HERONRIES.

BY REV. F. L. BLATHWAYT.

LINCOLNSHIRE.

IN the list of British Heronries, printed in 'The Zoologist,' 1872, nine Lincolnshire colonies are mentioned, of which four at that time were extinct, two of doubtful existence, and three still inhabited. The extinct heronries were formerly situated at Leake near Boston, Spalding, Donington, and Cressy Hall, all in the south-east of the county. In Thompson's 'History of Boston' (1856) it is stated that the Herons at Leake built in numbers for a long time in a large tree, which was literally covered with nests. It was cut down about the year 1830. Pennant evidently informed Gilbert White of the Cressy Hall heronry, as we see from two of the Selborne naturalist's letters written in 1769. This heronry appears to have been a very large one, as many as eighty nests being seen on one tree. Of the other heronries, one on Lord Yarborough's estate at Manby, near Brigg, was on the decline in 1851, and apparently extinct by 1872, owing to the felling of the trees, while a heronry formerly situated in Muckton Wood, near Louth, seemed in 1872 to be of doubtful existence. The only inhabited heronries at the time the list was published were:—One in Skellingthorpe Wood, four miles west of Lincoln; one at Swanpool (the "Swanpool," I presume, near the city boundary); and one at Haverholme, near Sleaford.

In the fourth edition of Yarrell's 'British Birds' vol. iv. (1884–1885) this list is brought up to date, and we find that these last three heronries were still in existence, that at Haverholme consisting of forty pairs of birds, while the Manby heronry, thought to be extinct in 1872, is stated to have been reduced from thirty nests to seven in 1884.

John Cordeaux, in his 'Birds of the Humber District,' 1872, merely repeats the list from 'The Zoologist' (which appeared a few months earlier in the 'Field'), and adds that a single nest was built on a tree in Nocton Park, near Lincoln; but in his "Revised List," 1899, he states that the species still nests "in

unimpaired numbers in old-established Lincolnshire heronries, also in a few fresh localities."

The above is all that I have learnt from published notes on Lincolnshire Heronries, so it may be of interest to give, as far as I can, the most recent information on the nesting of these birds in the county. During the early spring of this year (1908) I visited four existing heronries in the county, received news of a fifth, and visited also the site of the Swanpool heronry, which appears from 'Yarrell' to have existed in 1884. If I am right in identifying this "Swanpool" with the piece of water overhung with trees, known by that name, close to Lincoln, I can state that a heronry no longer exists there, but the one in Skellingthorpe Wood, less than three miles away, is still tenanted. During the last three years the birds have shifted their quarters in this large wood, and when I visited them on March 10th this year I counted about twelve nests, but fancy that only about seven pairs were breeding, sitting having evidently commenced.

On March 17th the heronry in Evedon Wood, Haverholme, was visited, where I found eighteen or twenty pairs of birds nesting. I am told by one who knows this colony well that the birds have not decreased much during the last twenty years.

Some birds from the Manby heronry, which, as mentioned above, was broken up by the felling of trees about 1870, appear to have shifted their quarters two or three miles to the north to Rowland Plantation, near Appleby Station. This year, on March 27th, rather more than twelve pairs of birds appeared to be breeding there, the nests being placed on the tops of high Scotch firs. Owing to the thickness of these firs I found it hard to count the occupied nests, but I saw at least sixteen birds, and others probably escaped observation.

A heronry also exists in Newball Wood, Langworth, about seven miles north-east of Lincoln. This colony is not mentioned in the above lists, so perhaps it is of somewhat recent origin. It has been known to me for about seven years, six or seven pairs of birds nesting there annually during that time. I have no knowledge of the date when the colony was established, but the number of birds seems to have lessened of late. One

observer has told me that not many years ago about fourteen pairs nested in the wood.

The site of the heronry in Muckton Wood, near Louth, according to the list in 'The Zoologist,' showed signs of re-occupation in 1872. Whether or not the birds returned to the wood, I cannot say, but a heronry exists in Tothill Wood, some three miles further east, which may well be an offshoot of the old colony. Mr. G. H. Caton Haigh has informed me that he noticed between twenty and thirty nests in the trees when he was shooting the wood last winter, but he has heard that an order has gone out that the birds are to be destroyed in the interests of trout-fishing.

It will be seen from the above that, so far as I know, the existing Lincolnshire Heronries, with approximate numbers of nesting birds, are as follows:—Skellingthorpe Wood (seven pairs); Evedon Wood, Haverholme (twenty pairs); Rowland Plantation, near Appleby Station (twelve pairs); Newball Wood (seven pairs); and Tothill Wood, near Louth (? twenty pairs). Possibly readers of this article may know of other colonies still existing within the county boundaries.

SOMERSET.

The following notes on five Somerset heronries may be of interest, as they probably give an approximate idea of the number and size of the colonies of these birds at present existing in the county. The most recent notes are the result of correspondence between myself and observers on the spot, so they should be quite reliable. Other colonies may exist in the county, though I think it somewhat unlikely there are any more important ones, as, when I was drawing up the account of "Birds" for the 'Victoria History of Somerset,' my correspondence with naturalists in various parts of the county brought no news of other heronries.

1. *Dulverton*.—This heronry consists at the present time of about seven or eight pairs, and is situated in Ellar's Wood. For a great many years a colony has existed in the neighbourhood, and the birds have repeatedly shifted their quarters. Last April I received the following interesting letter on the history of this colony from the aged Dr. J. B. Collyns, of Dulverton:—"A few Herons still remain in Ellar's Wood, a short mile from Dulver-

ton, in Somerset. Within the last few years they shifted their quarters from the higher western corner to further down in the cover consequent on some of their nesting-trees being blown down. I first remember the heronry in Steart Wood, contiguous to Pixton Park, where, in the thirties, the young ones were annually shot in mid-June by Lord Carnarvon's friends, and singly distributed. They were very good, skinned, stuffed, and roasted like hare. As a boy I remember the strawberries and cream which were enjoyed upon these occasions. Prior to their Steart holding I am reliably told the heronry existed in Shelve-acre Wood, a little below Combe, the Elizabethan residence of the Sydenham family, whence in 1790 they shifted to Steart after St. Barbe Sydenham had some of the trees cut down."

2. *Halswell* (near Bridgwater).—A heronry is said to have been started here about the year 1871, and consisted of forty or fifty pairs of birds in 1883 (*cf.* Zool. 1883, p. 222). In 1901 from twenty to thirty pairs still bred there, and the colony probably still exists.

3. *Brockley Park* (ten miles south-west of Bristol).—A heronry has existed here for thirty-six years at least, probably for a much longer time. This year there were about ten pairs of birds occupying the site.

4. *Knowle* (near Dunster).—This heronry appears to date from about the year 1857, and in 1872 consisted of about thirty nests built on larch-trees (*cf.* Zool. 1872, p. 3265). D'Urban and Mathew, in their 'Birds of Devon' (ed. 2, 1895), treating, on p. 185, of West Country Heronries, refer to the Knowle colony as situated "on a cone-shaped hill, on which almost every tree bears one or more nests." This note probably refers to a date several years previous to 1895, as my latest informant from Dunster—one who has known the heronry for twenty years—states that the numbers now are limited to six or eight pairs, and have not varied much since he has known the colony.

5. *Mells Park* (Frome).—A small colony consisting of two or three pairs has nested in Melcombe Wood, perhaps irregularly, during the last twenty years, and if it does not still exist it has only vanished during the last year or two. This may be an offshoot from the ancient heronry of Longleat Park, six miles away, but just over the Somerset border.

VERTEBRATES OF WALES AND IRELAND :
CORRIGENDA ET ADDENDA.

BY H. E. FORREST.

OWING to the passing of my recent paper on this subject (*ante*, p. 321) through the press not giving time to submit it for revision to Irish naturalists—a course which I fully intended to take—there are several regrettable mistakes in it, whilst no mention is made therein of the writings of recent authors on the subject. Of these the most important are Dr. Scharff's book on 'European Animals,' and the Handbook prepared for the Dublin Meeting of the British Association in 1908. For these errors and omissions I can only express regret. The following are:—

CORRIGENDA.

BATRACHIANS.—Of the three species of Newt only one occurs in Ireland—the Common Smooth Newt; the Great Crested Newt and Palmated Newt are unknown there. Whilst the Common Toad is absent from Ireland, the Natterjack is found in a small area on the south-west coast (*cf.* Dr. Scharff in both works mentioned above).

MAMMALS.—The Noctule is absent from Ireland. Major Barrett-Hamilton tells me that the large Bats taken in that country are Leisler's Bat—a species not yet authenticated in Wales. According to Dr. Scharff (*Proc. Roy. Irish Academy*, January, 1906) the remains of Cat found in cave-deposits in Co. Clare belong to the form known as the African Wild Cat, *Felis ocreata*.

ADDENDA.

With regard to the Fishes of the two countries, it is worth mention that the Gwyniad of Wales is represented in Irish waters by a closely allied species, the Pollan; whilst the Welsh Char is represented in Ireland by a number of local subspecies. Mr. C. Tate Regan, in a recent paper (*Ann. & Mag. Nat. Hist.* September, 1908), distinguishes six species of Irish Char.

Mr. R. J. Ussher points out that, whilst the majority of pre-historic mammals found in Welsh cave-deposits occur also in Ireland, the Lion, Glutton, Rhinoceros, and Bison have not yet been identified in Ireland.

In connection with the theory advanced to account for the absence of certain species from Ireland, the following are factors of some importance :—

(1) It is evident from the contour of the sea-bottom that a narrow land-connection between Scotland and the North of Ireland persisted for some time after Ireland had become separated from England by the sea.

(2) At the time when Great Britain and Ireland were still part of the Continental mainland, a great river existed which discharged its waters into the Arctic Ocean between the Shetland Islands and Norway; the Rhine, Thames, and other rivers of this region were all tributaries to this great river.

With regard to the first of these statements, I hardly think that the existence of this land-connection would affect the question of distribution of species. Any land animal extending its range into Great Britain after the sea had severed Ireland from England would not be likely to travel into North Ireland from Scotland, because that would involve a movement southwards, *i. e.* in a direction contrary to the general trend of all such species towards the north-west.

As to the second statement above, it is evident that the existence of a big river with tributaries extending over the entire district might have an important bearing on the distribution of freshwater fishes, because it would form a means of communication between streams and lakes now entirely severed from one another. In this way we may imagine that the various species (or subspecies) of Char and the different members of the genus *Coregonus* (Gwyniad, Pollan, &c.) may have each originated from a single species spread throughout this great river system. The local races subsequently acquired special characters owing to isolation and the influence of different environment in each case.

NOTES ON THE EPHEMERIDÆ.

BY GORDON DALGLIESH.

WITH the Mayfly will always be associated the name of Swammerdam, who did so much to further our knowledge of this insect. When we read that the tools employed by Swammerdam for the dissection of a Mayfly larva were so small as to require whetting under a microscope can we truly appreciate the labours of this indefatigable naturalist?

Swammerdam was born in Holland, and early inherited his father's tastes for the collection and study of natural history objects. Swammerdam, we are told, was famous for his minute dissections and inflated and injected preparations, and it was only after a number of hardships and rebuffs that his work was acknowledged and appreciated in France. From constant toil and the eye-trying work of the microscope, at the early age of thirty-two Swammerdam was completely worn out, nearly blind, and narrowly escaped death. About this time, too, owing to some disagreement with his father, he was turned away from the home that had hitherto sheltered him, and, after a life of abject poverty, died at the age of forty-three. Swammerdam's great work was posthumous, and was known as the '*Biblia Naturæ*.' This contained the complete life-histories of over a dozen insects. The history of the Mayfly was published during Swammerdam's life in 1675.

The Mayflies belong to the order Neuroptera, which order may be so called our oldest insects, for in the rocks formed during the remote Devonian period we find fossil "Mayflies," although of ancient type (*Platephemera antiqua*), during the time of the deposition of our coal-fields.*

There are about thirty-eight species of British Mayflies (W. F. Kirby, *in lit.*), and they are all extremely delicate insects, having the anterior wings largely developed and the posterior

* According to Hagen (Bull. Mus. Harvard, viii. p. 276 (1880-1)) this fossil may be regarded as a dragonfly. Brongniart considers it to be more allied to the Mayflies (*cf.* Sharp, Cambr. Nat. Hist. v. p. 428).—ED.

small or wanting. They have a rudimentary mouth, and the body ends in two to three long anal setæ or long hair-like filaments. They are remarkable for undergoing four instead of three changes from larva to perfect insect, and when fully formed the pupa comes out of the water and issues forth from this stage as a pseudo-imago, looking exactly like the perfect fly, but covered with a delicate membrane, which after a time is cast off, and the perfect insect appears. The vast swarms of Mayflies seen over the African lakes are utilised and compressed with gnats in the form of cakes by the Africans.*

The popular belief is that Mayflies in their perfect state invariably die after the sunset preceding their time of development from nymph to fly. Many of them, it is true, live for a few hours only, though a period of two days is on record.† I myself have proved that their vitality is not so feeble as is generally supposed.‡ One specimen (*Ephemera danica*) was on my setting-board for three days, and then still retained signs of life, for when touched it responded by gently waving the long setæ to and fro, although it had previously lain in the killing-bottle for quite five minutes. The long tail-filaments, when examined under a microscope, bear a close analogy in structure with the antennæ of many insects, and doubtless serve the function of such, the true antennæ being extremely small. In this supposition I have frequently held live Mayflies by their wings, and they invariably moved their setæ in exactly the same manner that many insects move their antennæ. A similar contrivance is found in the male Crickets (*Gryllotalpa*), which possess anal appendages covered with stiff hairs (an analogy to these is found in the Mayfly larvæ). These act as delicate organs of perception, and are employed by the Cricket when moving backwards in its subterranean progress. The anal setæ of the Mayflies serve another function when spread out (in exactly the same manner that the feathers in a bird's tail are spread out); they assist in flight. When soaring upwards the setæ are not spread

* Theobald.

† Miall, 'Natural History of Aquatic Insects.'

‡ De Geer kept *Ephemera vespertina* alive for eight days, and Mr. Stephens mentions having kept specimens of *Claeon dipterum* alive above three weeks (cf. Westwood, Mod. Class. Ins. vol. ii. p. 27, note).—ED.

out, but frequently are so in descent, and may act in much the same way as a parachute breaking the insect's fall.*

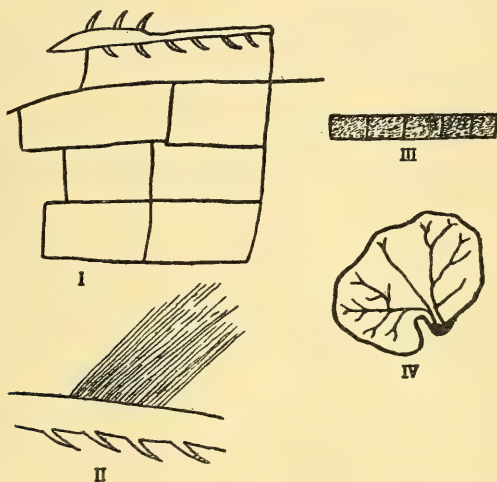
The flight of Mayflies is extremely pretty to watch. They rise and fall in regular rhythm. *Ephemera vulgata* looks very dark in flight; it either rises and falls or else flies straight away very swiftly, and often very high. *E. danica* looks reddish in flight, and flies if anything swifter than the last, but low, and never, according to my observations, very high. This species frequents swift-running streams. *E. vulgata* generally appears with due regularity the first week in June, and I have seen species of Mayflies from then through every month up till the first week in October. One quite small species, only slightly larger than a gnat, which unfortunately I was unable to identify, I found in swarms by Frensham great pond in South-west Surrey. This had a soaring flight, and often flew very high. It hardly appeared to move the wings at all. Numbers of these small flies settled on me, and left their pseudo-imaginal skins on my coat. Curiously enough, some time after this I happened to read in Miall's 'Aquatic Insects' the following passage:—"I saw in the evening a great crowd of small flies a little larger than gnats. So many settled on my clothes that I was completely covered with them, and great numbers left their thin pellicles behind on my clothes."

When the fly of *Ephemera vulgata* is examined microscopically some remarkable features present themselves. One is at once struck with the square appearance of the network of the wings, some of the veins forming almost perfect squares. On the outer nervure of the fore wing is seen a curious "thorn"-like structure exactly resembling small rose-thorns. A similar structure is seen on a dragonfly's wing, only on that insect the "thorn" structure is scattered all over the wing, and not confined to a given area as in the Mayfly's wing. This "thorn" structure I have observed also on the outer abdominal appendages of a Mayfly larva (*Clæon*). The tail-filaments in the fly are also

* "I found that when *Ephemera* fell upon a napkin spread over my knees they could only rise into the air with the help of their long tail-filaments." And again: "Now and then it rests upon the water with the help of the tail-filaments, so . . . prevent the insect from sinking."—Swammerdam.

divided up into squares, each square being covered with minute hairs.

The eggs of Mayflies are laid on the surface of the water, the whole quantity being deposited at the same time. The eggs, being heavier than the water, sink immediately. In *Ephemera vulgata* the eggs are described by Dr. H. Grenacher as possessing striated caps of reddish brown colour, which invest both poles of the egg. A mushroom-shaped stalk serves as a base and springs directly from the end of the egg. This is of firmer consistence than the striated part, whose numerous and close-set fibres radiate regularly from it. The fibres had previously been described by Leuckart as bundles of spermatozoa. No definite



information as to the functions of these striated egg-caps has been obtained. Grenacher has also described what appear to be long anchoring threads attached to the eggs of *E. vulgata*. From eight to twelve of these are fixed to a zone which encircles the egg transversely towards one end. Each thread bears a small knob at its free end, and these knobs apparently become entangled at the bottom of the stream and moor the eggs.*

The larvæ of Mayflies may be conveniently divided into three groups, namely: 1, burrowing; 2, swimming; and 3, creeping larvæ. The body of a larva is composed of fourteen segments,

* Miall, 'Natural History of Aquatic Insects.'

and the head is provided with long slender antennæ. The mandibles are long and curved. The three abdominal appendages present under the microscope some interesting features. The larva of a *Clæon* has three tail-filaments. The middle filament bears on each side a number of very fine hairs. The two outer filaments have only hair on the left side, bearing on the right side the "thorn"-like structure referred to above. The organs of respiration approach closely to gills in higher animals in the form of leaf-like plates ranged on each side of the body. These, when the living larva is viewed under the microscope, move up and down with great rapidity, causing a constant stream of water to flow inwards.

Mayfly larvæ, unlike many other aquatic larvæ, *never* come to the surface to breathe, but obtain all their oxygen directly from the water. The larva grows but slowly, some taking two years to complete their metamorphosis.

The pupa is active and resembles the larva, and traces of rudimentary wings only distinguish it from the latter.

EXPLANATION OF ILLUSTRATION (p. 459).

I. Portion of wing of *Ephemera vulgata*, showing "squares" and "thorn" structure.

II. Tail-filament of a *Clæon* larva, showing hairs and "thorn"-like structure.

III. Portion of tail-filament of fly of *Ephemera vulgata*, showing divisions covered with minute hairs.

IV. Gill of *Clæon* larva.

NOTES ON THE MAMMALS OF THE CHANNEL ISLANDS.

By R. H. BUNTING.

It is surprising that so little attention has been paid to the critical study of the Channel Islands Mammalia. One would have expected that the intensely interesting results which were obtained by collectors on such islands as St. Kilda, Skomer Island, the Hebrides, and the Orkneys, would have led to a thorough investigation of all the smaller islands lying round our coasts, and that the Channel Islands, on account of their easy access and pleasant situation, would have been among the first to be worked. As it is, however, no well-authenticated list of local species appears to be available, except such as occurs in the latest edition of Ansted and Latham's 'Channel Islands,' published in 1893, which is by no means a critical one. Since this was so, and because the National Collection was exceptionally poor in specimens from these islands, I was induced to spend my short vacation there, in the earlier part of last summer, for the purpose of collecting. Unfortunately my visit had to be too brief to put in more than a fortnight on Jersey and three days on Guernsey.

Specimens of the following species which I brought back are now in the National Collection, after having been critically examined by Mr. Gerrit S. Miller :—

FROM JERSEY.

MOLE (*Talpa europæa*) occurs in all parts of the island, some fields being completely overrun by it. Coloured varieties (saffron-tinted) are occasionally found.

COMMON SHREW (*Sorex araneus*) is fairly frequent, and shows a slight insular variation in the anterior breadth of the palate. Jersey specimens, as is usual with this animal, vary in coloration, those with the darker upper side sharply differentiated from the predominating lighter under side.

STOAT (*Putorius* sp.), although said to be fairly common round the coast—where the Rabbits have been driven by cultivation of the interior—I was able to obtain only one specimen, and that given me by a friend, nor have any others been taken since by those who promised to keep a look-out for it. This specimen was caught in a Mole-trap in Trinity, and presents a definite difference from either the English or Irish species, but Mr. Miller has been obviously unable to describe it as a distinct species until other specimens come to hand to confirm its peculiarities.

WOOD MOUSE (*Apodemus sylvaticus*) is about as frequent as in England, and shows no difference from the type. Up to the present there is no record of *A. flavicollis*.

HOUSE MOUSE (*Mus musculus*) occurs in its usual habitats all over the island. Specimens taken from the sandy soil of St. Ouens, where they are said to have occurred before the advent of houses, show a slightly sandy coloration.

BROWN RAT (*M. decumanus*) is as ubiquitous as ever.

JERSEY VOLE (*Evotomys cæsarius*). — This interesting species has been recently described by Mr. Miller (Ann. Mag. Nat. Hist. February, 1908) from two specimens in the National Collection, taken by Capt. Barrett-Hamilton at St. Heliers in 1896. It is related, according to Mr. Miller, to *E. skomerensis* on account of its possessing "a well-defined third re-entrant angle on the inner side of third upper molar," but differs from that species in its "shorter, more evenly cuneate nasals, broader rostrum, shorter tail, and much darker colour." Specimens which have recently been sent to me show measurements slightly exceeding those of the type-specimens. For instance, one (female) taken at Trinity, Oct. 9th, measures as follows (the corresponding measurements of the type are added in parenthesis for comparison):—Head to tail, 165 (145) mm.; hind foot, 18 (18); ear, 12 (11). Skull: Condyllo-basal length, 27 (25·6); zygomatic breadth, 15·5 (14); interorbital constriction 4·1 (4); occipital breadth, 12 (11·6); occipital depth, 6·8 (7); nasals, 7·8 (7); diastema, 7·8 (7·2); mandible, 15·8 (15·4); maxillary tooth-row, 6·4 (6·2); mandibular tooth-row, 6 (6).

The following measurements are taken from eighteen males and twelve females:—

	Head and body.	Tail.	Hind foot.	Ear.
Maximum...	120 mm.	54 mm.	21 mm.	12·5 mm.
Mean.....	103·6 mm.	46·95 mm.	19·03 mm.	11·5 mm.
Minimum	91 mm.	41 mm.	17·5 mm.	10·5 mm.

It is very abundant in Jersey, frequenting such habitats as *E. glareolus* does in England.

FROM GUERNSEY.

MUSK-SHREW (*Crocidura russula*).—Much more frequent here than the Common Shrew is in Jersey.

WOOD MOUSE (*Apodemus sylvaticus*). Again no *A. flavicollis*.

HOUSE MOUSE (*Mus musculus*).

BROWN RAT (*M. decumanus*).

FIELD VOLE (*Microtus* sp. aff. *agrestis*).—Mr. G. Dalgliesh called attention to the large size of the Guernsey Vole in this Journal (Zool. May, 1906, pp. 172–3), and suggested that it might prove to be an undescribed species or form. Unfortunately my very limited stay on the island prevented my taking more than one adult specimen of this animal. So that the question whether the Guernsey Vole is a new species or merely a form of *M. agrestis* must remain open until other specimens are to hand. Its large size and other peculiarities tend to indicate that it is a new species.

For the following list of Channel Islands Mammals, and for nearly all of the appended notes, I am indebted to Mr. J. Sinel, of Jersey, the able Curator of the Museum of the Société Jersiaise :—

STOAT.—Occurs in Jersey, Guernsey, Sark (Alderney?).

HEDGEHOG.—Occurs in Jersey and Guernsey. Probably introduced; much more common now than thirty years ago.

MOLE.—Occurs in Jersey and Alderney only.

MUSK-SHREW (*Crocidura russula*).—Common in Guernsey, rare in Jersey.

COMMON SHREW (*Sorex araneus*).—Common in Jersey.

PIPISTRELLE BAT.—Common in all the islands.

SEROTINE BAT.—Only known to occur locally by one specimen, now preserved in a private collection; it was taken in Georgetown, Jersey, in the autumn of 1893.

LONG-EARED BAT.—Common in all the islands; more abundant in Jersey than the Pipistrelle.

GREAT HORSESHOE BAT.—Recorded for Guernsey only, where it is common, but may possibly occur in Jersey also.

BARBASTELLE BAT ?.—A specimen (apparently of this species), now in the local museum, was taken from a cat in St. John's Road, St. Heliers, Jersey, September, 1907.

BROWN RAT.—Has not yet appeared in Sark, where *M. rattus* occurs in great numbers. Since it is found even on isolated rocks around the island, one may suppose that the Black Rat has for once been successful in overwhelming its powerful brown competitor, probably owing to superior numbers.

BLACK RAT.—Although abundant in Sark is getting rare in the other islands. The "Blue" Rat, which occurs on the Ecrehou Rocks, a few miles north-east of Jersey, belongs to this species. The Black Rats on Herm are much stronger and more robust animals than those on Jersey or Sark, and have longer hair on their backs (35 mm.) than the latter.

The Alexandrine Rat has been taken in Jersey.

HOUSE MOUSE.

LONG-TAILED FIELD MOUSE.—Occurs in Jersey, Guernsey, and Alderney.

FIELD VOLE.—Has not been taken in Jersey.

BANK VOLE.—Probably occurs only in Jersey.

WATER VOLE.—Once plentiful in Jersey, now rare.

RABBIT.—At one time native in probably all the islands, but now hybridized by imported "Belgian Hares" in Jersey, and by the English animals, which have so often been put down in Guernsey.

HARE.—Was abundant in Jersey up till 1868, probably indigenous, often added to from France, and now scarce.

SQUIRREL.—Once indigenous, introduced several times during the last twenty years, now fairly numerous.

FOX.—Was fairly numerous in 1850-60, and probably native, but is now extinct.

Mr. Sinel, in a recent paper, read (October 21st, 1908) before the Guernsey Society of Natural Science, has dealt with the distribution of the Mammalia of the Channel Islands. It is interesting to notice, in this respect, that one finds on Guernsey a *Microtus* and a *Crocidura*, whilst on Jersey an

Evotomys and a *Sorex* occur. Also that the *Evotomys*, which inhabits an island with so mild a climate as Jersey possesses, is closely allied to *E. nageri*, *E. vasconiaë*, and *E. norvegicus*, three species found in the colder parts of Europe.

OBITUARY.

CHARLES THOMAS BINGHAM.

ENTOMOLOGY has sustained a severe loss in the death of this well-known and amiable naturalist, at an age (sixty-one) when his friends might reasonably have hoped that many years of usefulness still lay before him. He was born in Ireland on April 16th, 1848, and died at his residence in West Kensington on October 18th, 1908.

As a boy, he was fond of fishing and shooting and other rural occupations, and on proceeding to India he devoted much of his spare time to the study of birds and their habits. Bingham's first paper was on *Anastomus oscitans*, published in 'Stray Feathers' in 1876, when he was Lieutenant in the 33rd N. I.; but he had been making ornithological observations for at least two years previously. At that time 'Stray Feathers' was edited by Allan Hume, with whom Bingham became very intimate. Bingham continued to contribute to 'Stray Feathers' till 1880. By this time he had risen to be Captain. Since 1877 he had been stationed in Burma, where much of his remaining life was spent, and where he ultimately became Conservator of Forests. From 1880 to 1893 he published nothing of importance, though he continued to collect and observe birds and insects. In 1894, however, he took up the study of Entomology in earnest, devoting himself at first to Hymenoptera and subsequently to Butterflies. His first entomological paper (on Hymenoptera) was published in the 'Journal' of the Bombay Society of Natural History, vol. viii. in 1894. He was in London in 1895, and was then Lieut.-Colonel in the Bengal Staff Corps. About this time he joined the Entomological and Zoological Societies.

Bingham then undertook, at first during a visit to London and afterwards when he settled in London on retiring from his official duties, to arrange the collection of Aculeate Hymenoptera in the British Museum. In 1896 he arranged the families *Pompilidæ* and *Sphegidæ*, and from 1901 to 1908 the families *Formicidæ*, *Mutillidæ*, *Evaniidæ*, and *Chrysididæ*. He also undertook to write the volumes on Aculeate Hymenoptera and Butterflies for the 'Fauna of British India,' then edited by Dr. Blanford, and on the death of the latter Bingham succeeded him as Editor of the series. Two volumes each were published, but the concluding volume on Butterflies remains unfinished. Since his retirement Bingham had suffered frequently from malaria, but though his health had been failing otherwise for some time, no serious consequences were feared till shortly before his death. He leaves a widow and two sons to mourn his loss.—W. F. K.

NOTES AND QUERIES.

MAMMALIA.

Cornish Mammals.—My late uncle, Col. C. L. Cocks, of Treverbyn Vean, in St. Neot's parish, near Liskeard, told me that the Marten used to be known in Cornwall as "Fairy," pronounced "Vairy," and suggested a connection with the heraldic fur—"Vair," although the "tinctures" as blazoned are by no means "proper" for this species. He told me of two or three occurrences in the county which I have since forgotten, but in one instance a Marten was found and run by foxhounds, which is very possibly the case recorded by the late Mr. Rodd in 'The Zoologist' for 1878, quoted by Dr. Clark (*ante*, p. 413). On June 5th, 1883, I sent my uncle a pair of Pine Martens, which he turned out at Treverbyn. The male was bred in my collection, and born on April 7th, 1882, and his mate was expressly purchased from the Zoological Gardens. She had evidently not been entered on the strength of the establishment, as no recent arrival is recorded at that time in the 'List of Animals,' either in the 1883 or the next (1896) editions, but she came, I think, from Wales. My uncle never saw any more of them, except once, only a few months (or perhaps weeks) afterwards, when, as he was driving homewards one day from the Liskeard direction, and when abreast of his own land on one side of the road, he saw a Marten in a tree at the edge of the wood on the opposite side. Several years subsequently a friend told me of some animals of which he had heard mysterious reports, near Dartmouth, and thought they might be Martens. As Dartmouth is less than fifty miles from where the two were turned out, I always hoped that this might be news of them, or of descendants; but as Dr. Clark mentions (*loc. cit.*) that "somewhere about 1885 it seems another example was killed in the East Looe Valley, a few miles from Liskeard," this is probably the register of death of one of the two, as the locality is barely ten miles from Treverbyn. But even so, as one or two breeding seasons had elapsed before that catastrophe (and only one individual is accounted for), it is just possible that there are survivors. A note on Polecats in Cornwall, by me, was printed in 'The Zoologist' for 1885. There used to be a large colony of Badgers

on my uncle's property above mentioned, but I have heard nothing about them recently. A notable feature was the wide, much trodden road leading from the hill-top on which the setts were down to a spring where the Badgers went to drink at the foot.

At places on the south coast of Cornwall I have been surprised at the readiness with which Otters negotiate the two hundred feet high cliffs. They get their living out of the sea at the bottom, but their marks are, or were, almost ubiquitous at the top. It seems extremely doubtful from what I know of the Grey Seal whether white pups ever swam, voluntarily or involuntarily, many yards; and so, unless they were born on the mainland (p. 415), it would be extremely difficult to explain how they got there! I have seen Ca'ing Whales between Holyhead and Dublin Bay, so one would expect them to get stranded sometimes on the north coast of Cornwall. — ALFRED HENEAGE COCKS (Poynetts, Skirmett, near Henley-on-Thames).

A V E S.

Aquatic Warbler near Eastbourne (Plate V.). — On Oct. 7th of this year I shot an Aquatic Warbler (*Acrocephalus aquaticus*) on the Crumbles. I was attracted by the striking eye-stripe when the bird put its head out of a tamarisk-bush. Its legs were light and the tail-feathers noticeably pointed. It gave one the impression of being a more fragile bird than a Sedge-Warbler. The weather at the time was unusually fine and warm; wind south-east. — E. C. ARNOLD (Eastbourne College).

Fecundity of the Chaffinch.—My experience in connection with the egg-laying capacity of this bird is certainly at variance with that of Mr. Ellison as quoted by Mr. Butterfield (*ante*, p. 428). My note-book accounts for one hundred and thirty-two nests of the Chaffinch, all containing eggs, fifty-seven nests having been found in Southern England and the remainder in Yorkshire and Lancashire. On no occasion have I found more than five eggs in a nest; less than five, however, is not a common clutch. But I have found clutches of six eggs on one or more occasions in nests of the House-Sparrow, Linnet, Lesser Redpoll, Bullfinch, and Greenfinch; the last-named species, in my experience, most frequently of all finches that I know exceeds the clutch number of five. I have on one occasion found a Greenfinch's nest containing seven eggs. — WALTER GYNGELL (Scarborough).

Short-eared Owls nesting at Rainworth.—During last autumn and winter we had seven or eight of these birds (*Asio accipitrinus*) in each

of two young plantations—one of forty-five acres, the other twenty-seven; both are full of white forest grasses. On walking through them about the middle of April I found a pair in each, and, as they were very quiet places, hoped they would nest. On May 1st I went into the twenty-seven acre wood, and after a short search found the nest, with eight eggs. It was in a part rather bare of young trees, and where there was a lot of long grass, and placed under a small



NEST OF SHORT-EARED OWL.

Scotch fir. I was very delighted, as they were the first I had ever seen, and the first ever recorded for Notts. — J. WHITAKER (Rainworth Lodge, Notts).

Honey-Buzzard (*Pernis apivorus*) in Suffolk and Norfolk.—Referring to Rev. F. L. Blathwayt's note (*ante*, p. 428) respecting the occurrence of the Honey-Buzzard (*Pernis apivorus*) in the Eastern Counties

last September, I know, in addition to the three already recorded by him, of two others being obtained. One was shot near Beccles and the other a few miles north of Great Yarmouth. Both of these birds were of the dark form, and are now in the possession of Messrs. W. Lowne and E. Saunders, local taxidermists. On Nov. 9th I received, in the flesh, an example of the Merlin (*Falco æsalon*), which was shot on Breydon walls. It was a male in fine adult plumage. This species is here seldom obtained in this plumage.—B. DYE (Great Yarmouth).

Rough-legged Buzzard (*Buteo lagopus*) in Lincolnshire.—About Nov. 1st last a specimen of the Rough-legged Buzzard was obtained at Skegness, on the Lincolnshire coast. The bird is in the hands of a Lincoln taxidermist. This species is at times a somewhat numerous autumn immigrant to the east coast of Great Britain.—F. L. BLAYH-WAYT (Lincoln).

Interesting Ducks in Notts.—A pair of Pochard remained on the lake at Thoresby all the spring and summer; I myself saw them in March, May, and August. They most probably nested, but this fine lake (ninety-two acres) is full of Pike, some over thirty pounds, so young ducks, especially the diving ones, have little chance of attaining maturity. On March 21st, when fishing on the same piece of water, I saw four Scaup. On May 2nd I could only "spot" three—probably one was sitting—and again on August 14th I saw two females. Mr. Forrest, of Shrewsbury, was with me in May, and the Rev. B. E. Aplin in August. The birds were by themselves, and no mistake as to their identity was made. I also saw a solitary male Goosander there in March, May, and August; there were as many as twenty on it in February. On Nov. 2nd, when shooting Ducks on Rainworth Water, I shot an immature Common Scoter, a rare bird so far inland—over forty-five miles to nearest sea.—J. WHITAKER (Rainworth Lodge, Notts).

Golden-eye in Somersetshire.—It may be of interest to state that an immature male Golden-eye (*Clangula glaucion*) was shot on the river at Lymington, near Yeovil, on Oct. 31st. —GORDON DALGLIESH (Brook, Witley, Surrey).

Retention of Summer Dress by Great Crested Grebe.—Referring to Mr. Aplin's article on the above (*ante*, p. 407), the following may be of interest:—Mr. E. C. Stuart Baker, a well-known Indian ornithologist, wrote to me some little time ago that "*Podiceps cristatus* is quite common in Assam, and these birds retain their breeding

plumage all through the winter when fully adult." Writing on the Indian Dabchick (*P. capensis*), Mr. Finn (Zool. 1902, p. 303) records that a pair of these birds retained the summer plumage all the year round.—GORDON DALGLIESH (Brook, Witley, Surrey).

VERMES.

Sea-Mouse near Plymouth. — A small specimen of the above (*Aphrodite aculeata*) was brought to me recently by a fisherman who caught it in the Millbrook Lake while fishing for winkles and shrimps. It is a curious little thing, and measures about three inches long by one and a half wide (they are usually about five or six inches long, so that this specimen is not full grown). Its upper surface is covered by a double row of broad membranous plates overlapping each other, beneath which are the aerating gills, like little fleshy crests. These plates are covered by a sort of hair which springs from their outer margin, and besides these the upper surface is beset with bundles of iridescent bristles, brilliant as the plumage of the Humming-bird, and of which metallic blue, green, and gold are the predominating colours. The head is furnished with tentacular cirrhi, and tufts of bristles as well as tentacular limbs spring from each segment of the body.—WILLIAM HEARDER (195, Union Street, Plymouth).

Erratum.—In my note on "Old Local Bird Names" (*ante*, p. 431) the old local name of the Common Heron in South Pembrokeshire should be "lougie-crane," and not "hougie-crane" as is printed.—H. B. BOOTH (Ben Rhydding, Yorkshire).

NOTICES OF NEW BOOKS.

Bird-Hunting through Wild Europe. By R. B. LODGE.
Robert Culley.

WE well remember the astonishment experienced a few years ago on being told by an eminent geographer that there were still remote spots in South-east Europe that would well repay the journey of an explorer. Mr. Lodge has travelled in many parts of this wild country, and has written a book which, as might be expected, and as all naturalists desired, is largely ornithological in character. That Albania is a wild country is undeniable from the terse verdict of Mr. Lodge: "There are no roads, no bridges, no law, no protection, no justice for any-

body." In these primitive communities, however, it is evident that the sportsman or naturalist is far safer than a missionary, and this seems to be the case in all parts of the world; it has been the writer's experience in Malaya and Southern Africa, and Mr. Lodge evidently possessed that one touch of nature which opens the savage heart as well as the hut of its owner.

The opening chapters refer to birds'-nesting in Spain, but it is when we reach the Balkans that the narrative has perhaps the greater charm, and we are then in the haunts of the Pelicans (*Pelecanus crispus* and *P. onocrotalus*), the Great White Heron (*Ardea alba*), and the now unfortunately rare Lämmergeier (*Gypaëtus barbatus*), to find and photograph the nesting sites and to procure the eggs of which incited the journeys of our author. Though the quest of the Lämmergeier was not successful, the object of the expedition was achieved with the Pelicans and *Ardea alba*; while the labour, time, and exposure expended in finding these birds and their nests, and photographing them as well, prove that the ornithologist must if necessary possess the hardihood and take some of the risks of the big-game hunter. To these birds is attached a narrative and beautiful illustration that will alone make this book of permanent value in ornithological literature. Of course other birds were found, for the Balkans are the home of many Raptores, and regarding these we meet with a very interesting observation: "The number of addled eggs one finds in the nests of the great Raptores has been, as far as my experience goes, very large. I don't know how to account for it, unless it is that these birds, in the absence of enemies powerful enough to prey on them, and being but seldom molested by the inhabitants of these wild countries, live to a great age—in fact, outlive their powers of reproduction. In the course of the time covered by this book, for example, I have met with the following addled eggs of raptorial birds: one Bonelli's Eagle's and two Griffon Vultures' in Spain, three Sea Eagles' in Albania, and one Black Vulture's in Roumania."

The nests that may be found in Hungary are well described, and may probably incite some ornithologists to take an early holiday and make Budapest the jumping ground for a visit to a Palæ-arctic paradise so far as birds are concerned. The entomologist,

especially the lepidopterist, will read with eager interest that in the Dobrudscha *Lælia cænosa*, in the larval condition, were found in great abundance on reed-leaves.

We have enjoyed the perusal of this very fully and beautifully illustrated book. It is one in which the ornithologist will find facts, and it will rejoice the heart of the collector by recalling reminiscences of other days.

Experimental Zoology. Part I. Embryogeny. By HANS PRZIBRAM, Ph.D. Cambridge University Press.

WE read that the plan of an 'Experimental Zoology' grew out of the revised edition of the author's 'Introduction to the Experimental Morphology of Animals,' which appeared three years ago. This great work, revised, supplemented, and illustrated, will now be procurable in parts or subjects, of which the present is the first, and may be purchased separately, thus conferring a boon on students who do not desire the whole series. The English translation has been made by Miss Hertha Sollas, and has been revised by Mr. R. C. Punnett, of Gonville and Caius College.

Of course this work is of a much more technical and abstruse nature than the bionomical standard of zoology upheld in 'The Zoologist,' but it is the most complete work of the kind to date, and we give one extract in illustration. Under "Influence of External Factors" and the subject "Moisture" an abstract is given of one of the results obtained by P. Kammerer: "If we mature *Alytes* spawn in its normal environment on land we may observe that the larvæ which emerge and crowd into the water require a period of development many times longer than that of the other anura; and *Hyla* spawn matured on land gives larvæ which require a year for their development instead of a few weeks. But if we bring *Hyla* spawn to maturity in its normal environment in water the larvæ born in May are metamorphosed in August of the same year, and the same occurs when *Alytes* spawn develops abnormally in the water; the young toads are developed from the larvæ in an equally short time."

The volume, besides its illustrations, contains for the subject a bibliography to date.

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